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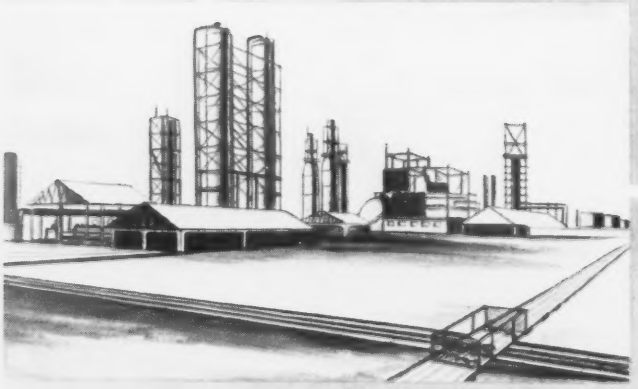

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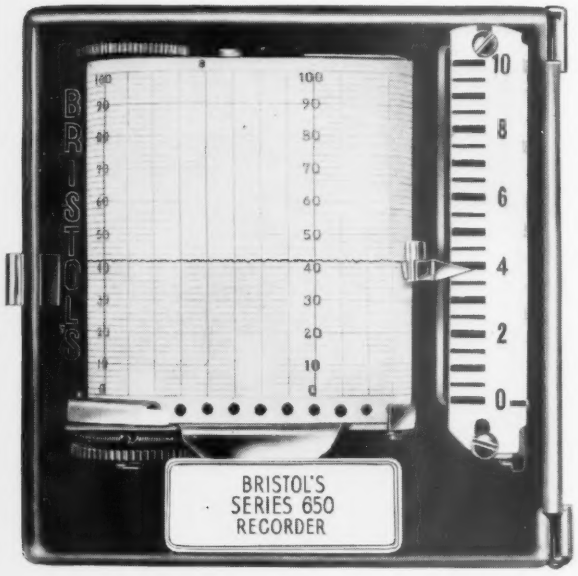

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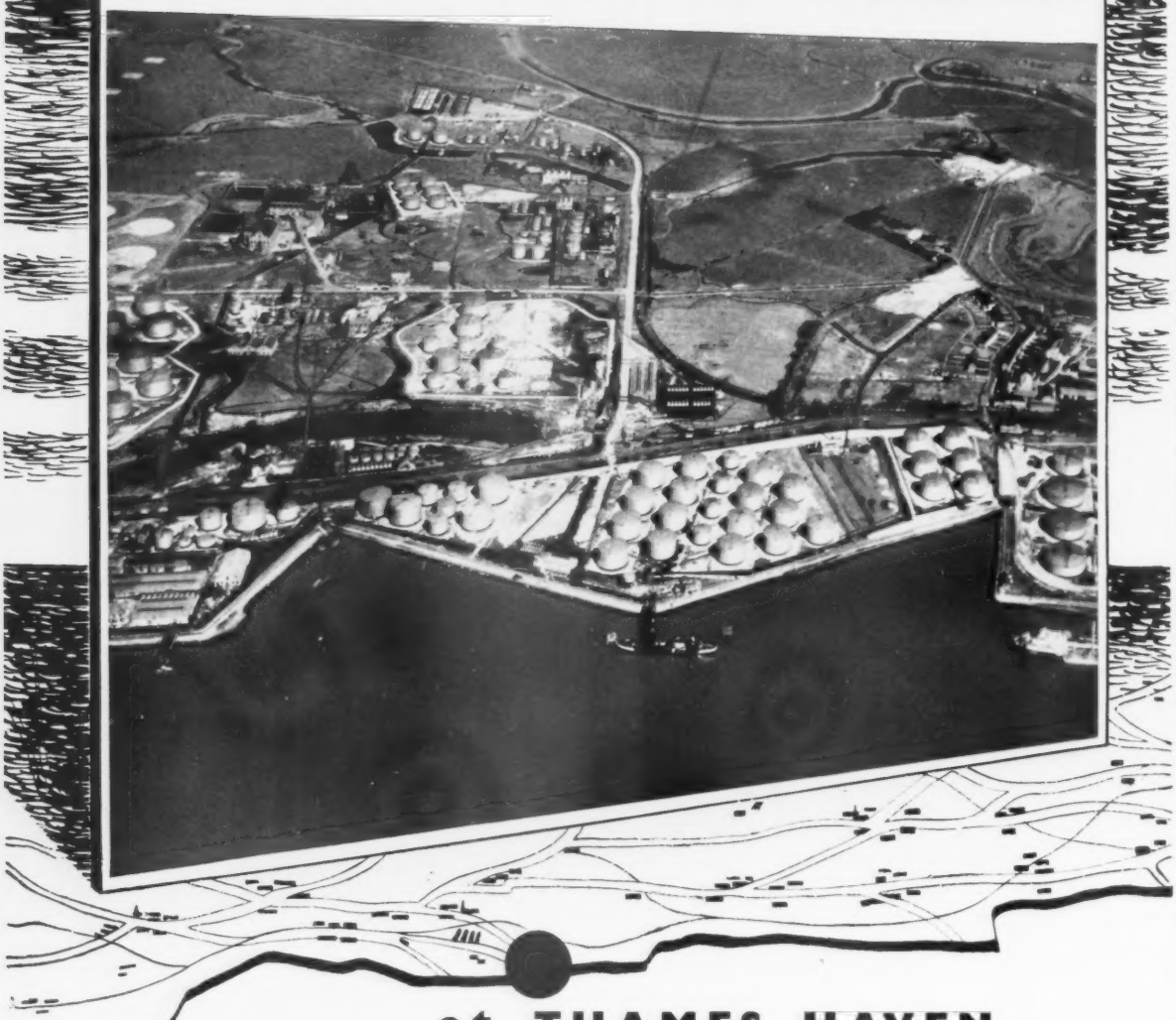

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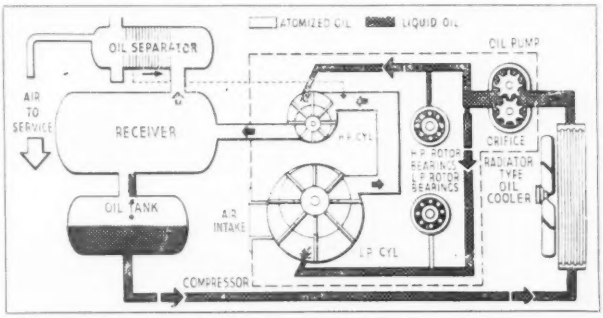

Diagrammatic explanation of the Power Vane Rotary Compressor

POWER VANE ROTARY COMPRESSORS

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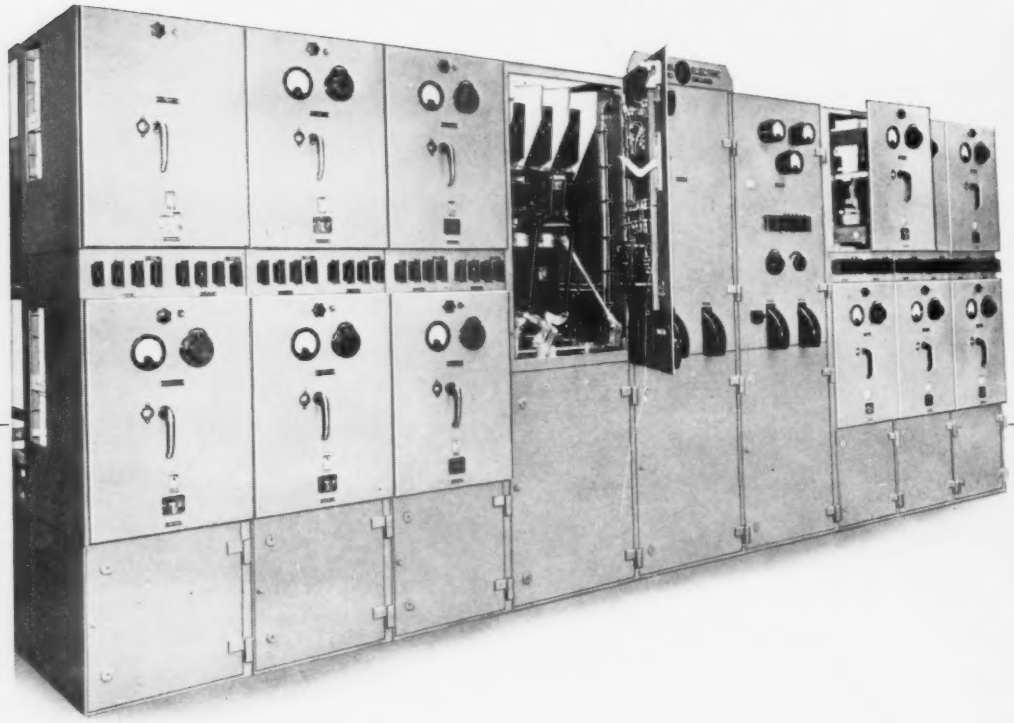
Air circuit breakers for medium voltage distribution



The 415 volt 15 MVA single double tier switchboard illustrated is one of several supplied to the various pumping stations of the Iraq Petroleum Co. Ltd. It incorporates types OB2 and OB3 air circuit breakers, each with double isolation.

The type OB2 circuit breaker is available in current ratings of 600 amps and below, whereas the type OB3 circuit breaker has a maximum current rating of 1600 amps and breaking capacity of 30 MVA.

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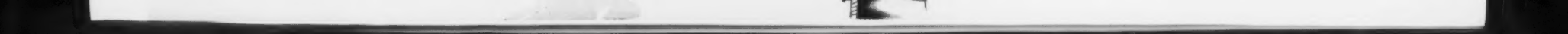

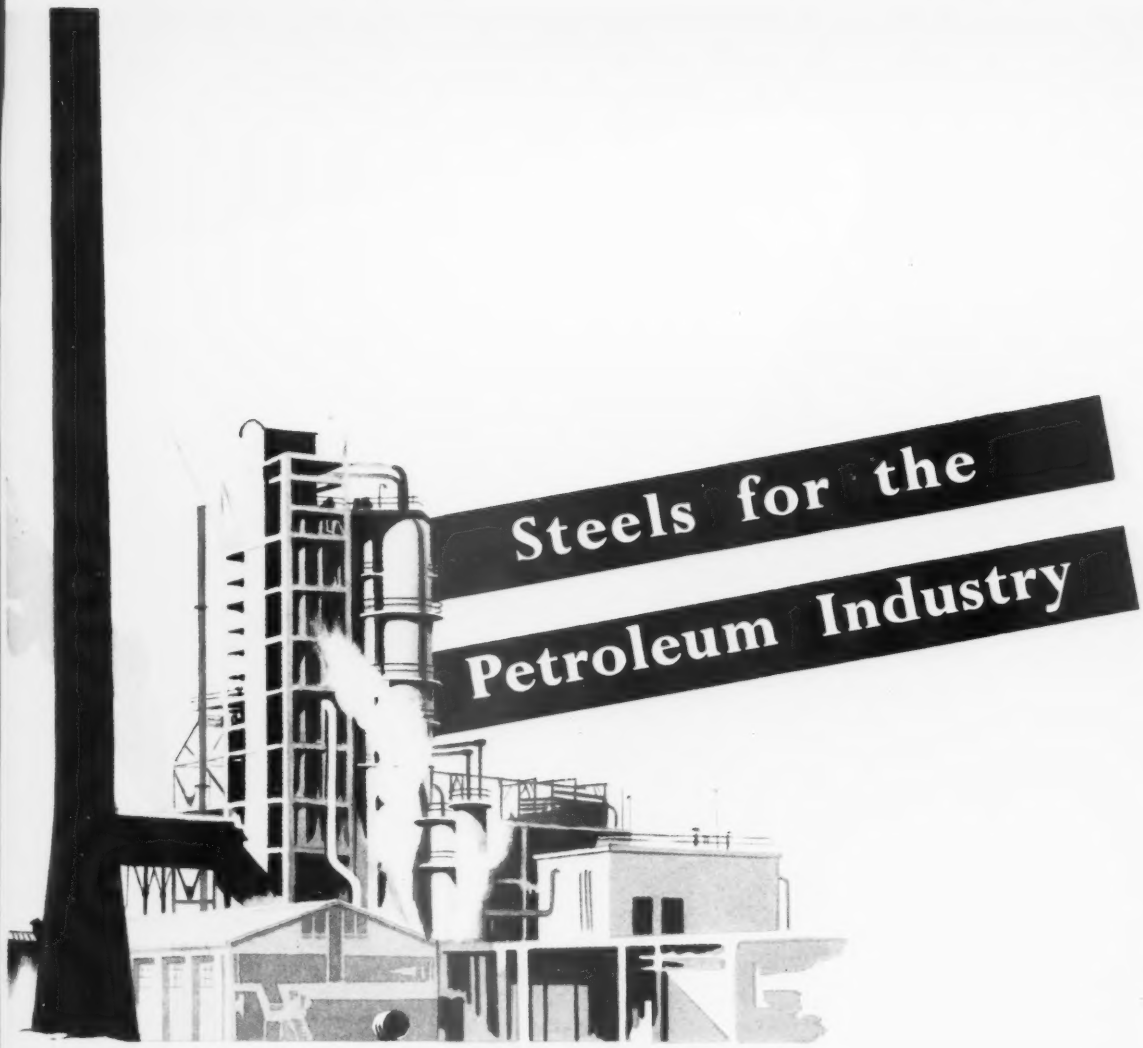

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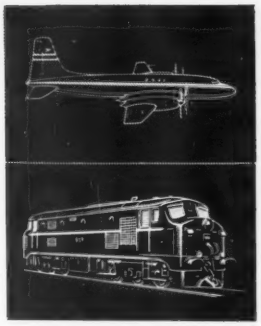

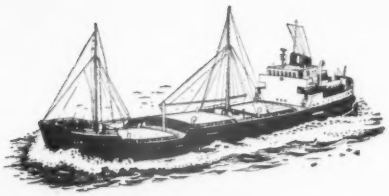

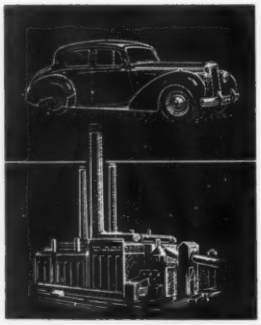

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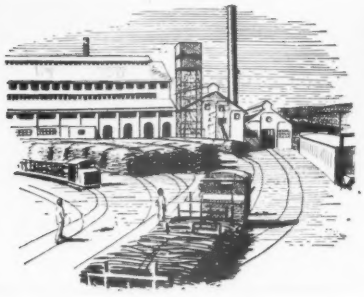
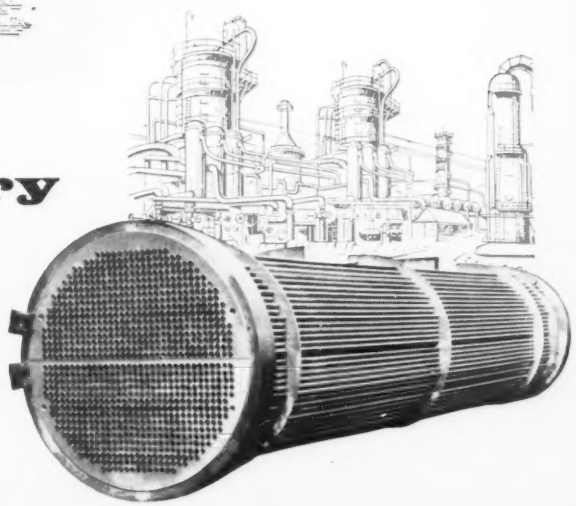


industry



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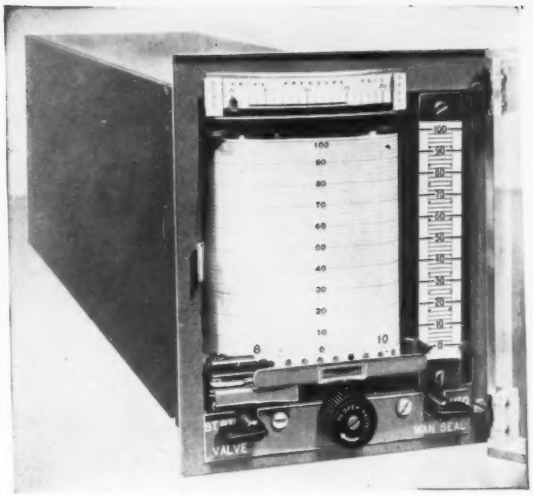
Location of control knobs ensures that manipulation (from front of panel) does not obscure view of pointer or scale.



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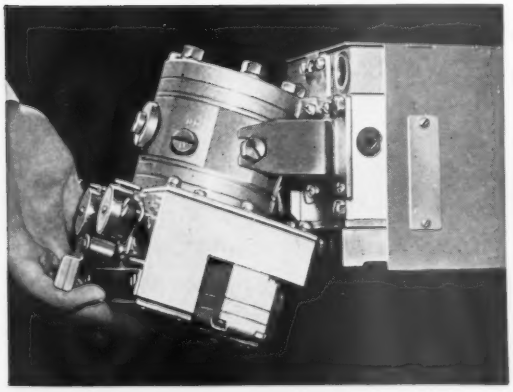

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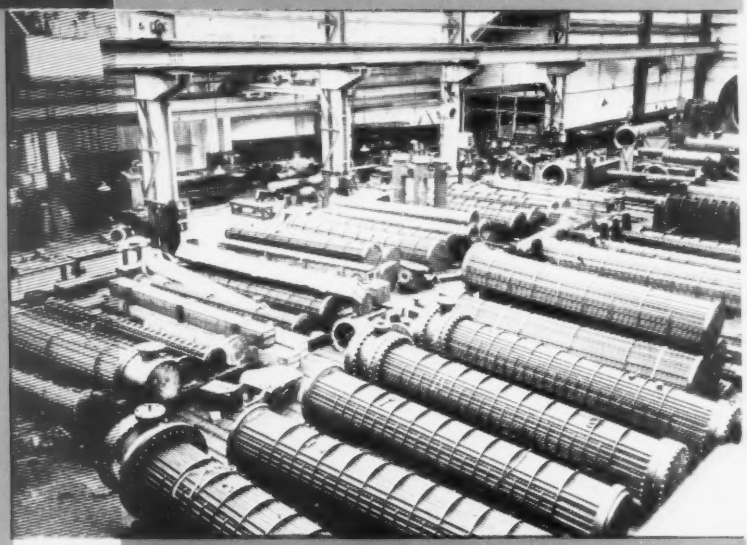

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THE INSTITUTE OF PETROLEUM

REVIEW

Volume 10, No. 112 April 1956

Honorary Editor: E. B. EVANS, M.SC., PH.D., F.R.I.C. *Hon. Associate Editor:* D. L. SAMUEL, B.SC., A.R.I.C. *Editor:* GEORGE SELL

The 1956 Annual Dinner

Some thirteen hundred members of the Institute and their guests assembled at Grosvenor House on 22 February for the 1956 Annual Dinner of the Institute, at which the Minister of Fuel and Power, the Rt. Honourable Aubrey Jones, M.P., was the guest of honour.

The chair was taken by the President of the Institute, Lt.-Col. S. J. M. Auld, O.B.E., M.C. Also present was Rear-Admiral C. H. Lyman, U.S.N., the United States Naval Attaché.

The official guests included: Maj.-Gen. W. E. V. Abraham, C.B.E., director, Burmah Oil Co Ltd; R. J. Ayres, C.B.E., deputy secretary, The Ministry of Fuel and Power; L.M. Broadway, managing director, C.C. Wakefield & Co Ltd; Dr W. Campbell-Smith, C.B.E., M.C., president, The Geological Society of London; Lt.-Gen. Sir Maurice S. Chilton, K.B.E., C.B., Quartermaster General to the Forces; C. T. Digby-Jones; Lord Godber of Mayfield, chairman, The Shell Petroleum Co Ltd; J. C. Gridley, C.B.E., chairman, Mobil Oil Co Ltd; Air Chief Marshal Sir Donald Hardman, K.C.B., O.B.E., D.F.C., Air Member for Supply and Organization; R. Henderson, O.B.E., director of stores, The Admiralty; T. Hindmarch; A. A. Jarratt, Private Secretary to the Minister of Fuel and Power; P. Johnson, O.B.E., Scientific Adviser, The War Office; J. B. Kay, oil geologist, The Ministry of Fuel and Power; R. Kelf-Cohen, C.B.; E. G. C. Mardall, managing director, Trinidad Leaseholds Ltd; Vice-Admiral (E) Sir Frank T. Mason, K.C.B., C.B.E., Engineer - in - Chief to the Fleet; Sir John Maud, G.C.B., C.B.E., Secretary, The Ministry of Fuel and Power; Hector McNeil, vice-president, The Institute of Fuel; E. H. Moline, Petroleum Attaché, the United States Embassy, London; J. M. Pattinson, managing director, British Petroleum Co Ltd; J. W. Platt, managing director, The Shell Petroleum Co Ltd; B. F. Pool, C.B.E., Director of Naval Contracts; Dr W. Reid, president, The Institute of Mining Engineers; C. A. E. Shuckburgh, C.B., C.M.G., Assistant Under Secretary of State, The Foreign Office; G. V. Sims, president, The Council of British Manufacturers of Petroleum Equipment; Sir Leonard Sinclair, chairman, Esso Petroleum Co Ltd; R. E. F. de Trafford, O.B.E., chairman, Manchester Oil Refinery Ltd; C. M. Vignoles, O.B.E., managing director, Shell-Mex and BP Ltd; R. N. Wakelin; Sir Owen Wansbrough-Jones, K.B.E., C.B., chief scientist, The Ministry of Supply.

Among the Members of Council present were: (*Past-Presidents*) T. Dewhurst; E. A. Evans; Prof F. H. Garner, O.B.E.; H. S. Gibson, C.B.E.; C. A. P. Southwell, C.B.E., M.C. (*Vice-Presidents*) Dr E. B. Evans; Prof F. Morton; J. A. Oriel, C.B.E., M.C.; E. J. Sturgess; G. H. Thornley. (*Members*) W. S. Ault; S. A. Berridge; V. Biske; A. S. Brooman; W. H. Davies; E. J. Dunstan; F. L. Garton; A. J. Goodfellow; N. W. Grey; H. Hyams; Lt.-Col. E. C. Masterson; J. S. Parker; D. L. Samuel; O. F. Thompson, O.B.E.; A. T. Wilford; Dr C. G. Williams; C. S. Windebank. The Honorary Secretary of the Institute, C. Chilvers, was also present.

The President photographed with (right) *the guest of honour, the Rt. Honourable Aubrey Jones, M.P., and* (left) *Rear-Admiral C. H. Lyman, U.S.N.*

The Industry and the Institute

The Right Honourable Aubrey Jones, M.P., proposing the toast of "The Petroleum Industry and the Institute of Petroleum", said that it was very kind of the Institute to have asked him, a very new minister, to come to the Dinner and to propose such an important toast.

Speaking of his four responsibilities, coal, gas, electricity, and oil, Mr Jones said that in his first ministerial utterances he had endeavoured to give a sense of future to the coal industry. He had not, however, reckoned with the repercussions which follow on the *obiter dicta* of ministers and was very distressed when he heard that it had been deduced from this that "this new Minister is interested only in coal, he doesn't seem to be the least interested in oil".

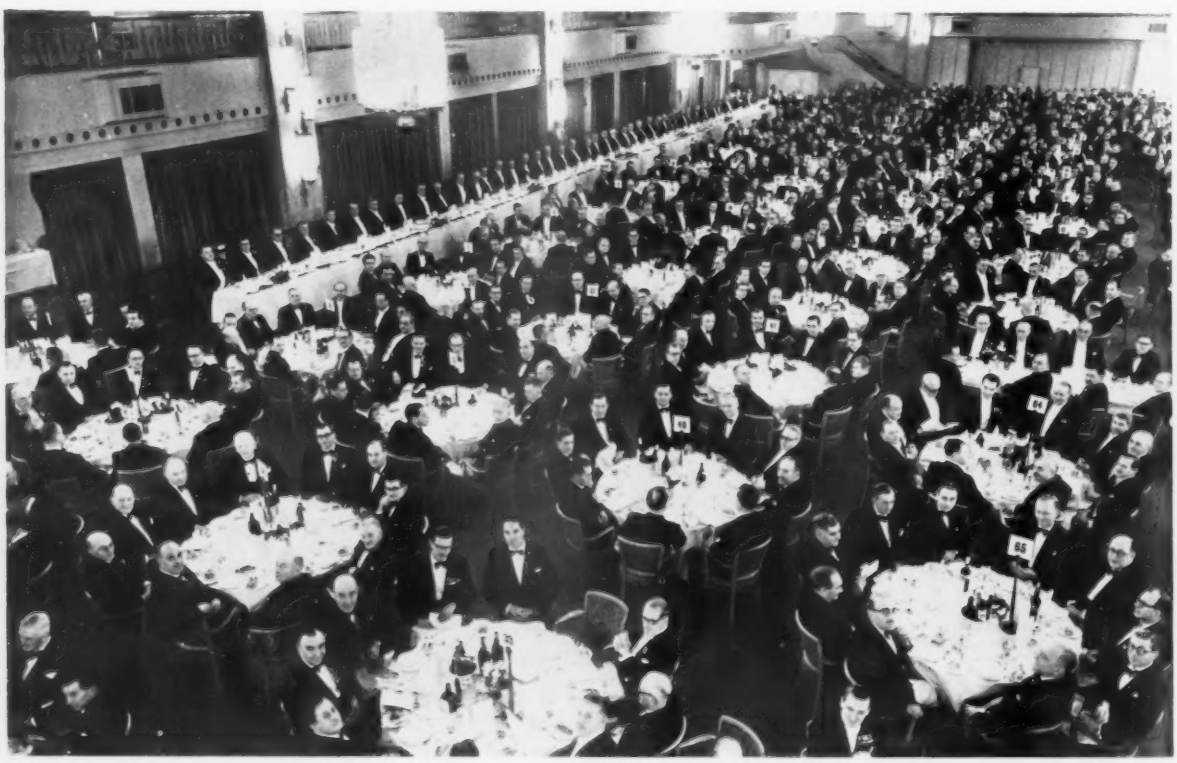
The President (left) *with some of the official guests—Sir John Maud, Lord Godber, Air Chief Marshal Sir Donald Hardman, Dr W. Reid, and J. M. Pattinson*

Mr Jones said that he thought he understood how this had come about, and said: "I often feel that we are the victims in this age of the statisticians, they are the seers of our time. Their job is to peer into the future and as a result of these cogitations and scrutinies of theirs they have given us certain estimates of energy requirements in the year dot. They have said to us, the estimate of requirements will be *x*, of which *y* will be contributed by coal, and therefore *z* will have to be contributed by oil. As statisticians well know, all these estimates are subject to great uncertainties, but when once they appear on paper, the qualifications are forgotten and they acquire the fixity and sanctity of ancient oracles. The estimate of demand becomes a fixed quantity and when, therefore, a poor Minister of Fuel and Power addresses himself to the coal industry and says 'Please, will you produce more than *y*', the oil industry turns round and says, 'Ha, this Minister is saying that our industry must produce something less than *z*'.

"I regret very much this way of looking at things. I admire the statisticians very much, I am no statistician myself, but we ought not, I think, to fall unsuspectingly into the trap laid for us by the statisticians and we ought not mechanically to echo the jargon of our cleverest members.

"I would like to make an appeal to you to get away from this mode of looking at fuel problems, to get away from the idea of a fixed energy requirement, of so much being contributed by coal, and therefore so much having to be contributed by oil.

"May I suggest to you this way of looking at it. We are living in a time when the economy is moving forward at a very fast rate, a faster rate than we have known for very many decades, and it is doing this I think for two reasons. We



have in our time speeded up the application of science to industry, and what is more, thanks perhaps to the late Lord Keynes, we are not quite so terrified of those periodic slowdowns in the economy to which we were once subject. We have been moving fast, the Chancellor has said perhaps too fast. We could move faster still if only our basic industries, and in particular our heavy industries, were sufficiently large to sustain the advance, were large enough to accommodate swifter progress on the part of the lighter industries. In other words, the figure of requirement, I suggest to you, is not fixed. The figure of requirement is what our energy supplies make it. Produce more coal, produce more oil, in excess of the target. The demand will be there. The lighter industries will be able to be carried forward.

"It is in the light of this conception that I wish to make it abundantly clear to you without any doubt that the target announced for the oil industry by my predecessor stands unchanged. Nobody is more aware than you are of the formidable nature of that target. You remember that it implied a trebling of the consumption of black oils in this country between now and 1960. It is a formidable target, but then it is a compliment to you that the target is a formidable one. It would be an insult to put before a formidable industry a less formidable target. I would also like to make it clear that the target is unchanged despite the statement made in the House of Commons the other day by the Chancellor of the Exchequer. The Chancellor appealed to the country, rightly, to prune and pare a little, to cut out, to do away with, the unnecessaries, the trivialities in investment. But when it comes to long-term investment in these great basic industries on which our future rests, the target is unchanged.

Sir Leonard Sinclair and the President

"The target, of course, is fixed in terms of quantities, but as business men you will not be crude enough to think merely in terms of quantities. You think also in terms of cost, and I trust deeply that you will not think a Minister crude enough to think merely in terms of quantity. A Minister, too, has to have regard to cost. This target put before you does imply certain added costs to our balance of payments. The target means that we as a country for the first time become dependent for some of our fuel requirements on imports. I am not dismayed by that, I think we can still remain a great industrial country while being dependent for part of our fuel requirement on imports. But because of the effect of this on the balance of payments I think it would

Lt.-Gen. Sir Maurice S. Chilton, the President, and Sir Owen Wansbrough-Jones

be right to ask you to endeavour, in meeting the target, to minimize the burden as much as you can.

"Then, too, the oil industry is, to my admiration and envy, a great international industry, one of the very few and rare great international industries, and hitherto it has had to deal with a problem common to the entire world and the same for the entire world. Well now perhaps we approach a different moment of time, when the problem is different for different parts of the world, when you have one pattern of consumption in Western Europe and in the British Isles, and a different pattern of consumption in the United States of America. As a British Minister I am, of course, preoccupied with the British problem, but just because that is the subject of my preoccupation I would like to thank you as an international industry for the way in which you have addressed yourselves to a British problem and I would like, too, in the same context if I may say so, to thank in particular our American friends for the way in which they have given thought to a specifically British problem. It is in the conviction and the hope that this co-operation will continue and that you will remain unrelaxed in the pursuit of the target put before you that I am happy to propose the toast of the petroleum industry and its most admirable forum in this country, the Institute of Petroleum."

The President's Reply

Replying to the toast of "The Petroleum Industry and the Institute of Petroleum", Lt.-Col. S.J.M. Auld drew attention to the fact that this was the first time the Minister had handled oil men in bulk and wished him, on behalf of the industry, a long and successful occupation of his important office. The Minister had given the petroleum industry full assurance of his interest in their problems and his intention to use the Institute of Petroleum to its highest ability, which Colonel Auld pointed out was not inconsiderable.

Whilst mistrusting explanations and being suspicious of statistics, the President felt he must read the headlines of the Institute's activities during the past year, and said: "We have continued to increase our membership, we have balanced our budget for the year, our relations with our foreign associates and friends are on the whole most commendable, and our Branch activities continue to expand, in fact we now have a new Branch in the Persian Gulf. Our publications are highly sought after and I am very glad to say not merely for their educational value but because of their advertising value. We are, it would seem, approaching the zenith of our power in this representation of a great industry. It is not merely a great industry, it is a great international power and it is one which is good for humanity as a whole. It is raising the standard of living and I think most of us feel in our hearts that it is the chief guardian of our peace. It has been said that it is the means of breaking down the barriers of colour and creed and race."

Colonel Auld then went on to mention the World Petroleum Congress which had been a great success and a great effort of organization on the part of their Italian friends. It was interesting to note, he said, that after the talks in Rome, Italy had asked for guidance in forming an Institute of Petroleum on British lines. There was a saying in Italy that when London sneezes Rome has pneumonia. If that great sympathy lasted it might be of use to regard our international arrangements with a clear, benevolent, and wise eye, because that was the way oil was going to make its biggest step forward in helping humanity.

The President then drew attention to the fact that work had already commenced on the Institute's new home and all that was needed now was money. The member companies and corporate members would, without doubt, regard the appeal recently launched as a pleasurable obligation.

Proposing the toast of the guests, Colonel Auld paid tribute in particular to two elder statesmen of the Institute, Lord Godber of Mayfield, and Sir Leonard Sinclair, who, apart from having been elevated and honoured by Her Majesty recently, had always been the "ralliers around, the great supporters, the encouragers".

In conclusion, Colonel Auld said that it would be most inappropriate if the Dinner was ever held without American representation, and he welcomed the guests in the name of the U.S. Naval Attaché, Rear-Admiral C. H. Lyman.

Rear-Admiral Lyman, replying on behalf of the guests, said how much they were enjoying the pleasure and privilege of being the guests of the Institute.

The Navy, he said, had long been indebted to the petroleum industry, and he recalled that his own time in the Navy went well back into the days of the fire-room shovel. He particularly recalled the time when he and a fellow midshipman had volunteered for a tour in the engineer's force during a cruise involving two trans-Atlantic passages. "We shovelled our way across and back", said Rear-Admiral Lyman. "The experience was not relishsome, and ever since it has occupied a secure place in that sadly over-crowded

The General Secretary and the Editor

category of things which we would do differently if we were doing them over again. It is remarkable how one's attitude towards high-speed manoeuvres has been changed by that little valve which makes it so easy just to push that much more Bunker "C" fuel oil into the boilers."

Explaining the term Bunker "C" fuel oil for the sake of his fellow guests, Rear-Admiral Lyman said: "this is merely a residual fuel resulting from the fractional distillation of crude oil and is a viscous petroleum product having a Saybolt Furol viscosity not exceeding 300 seconds, with a bottom sediment and water percentage not exceeding 2."

Rear-Admiral Lyman concluded by saying that he would sit down before he could be cited as an example of a saying which should be familiar to those who specialized in the field of lubricants: "The human being is the only mechanism so far devised which becomes more noisy when it is well oiled."

All photographs by the Grosvenor House Photographic Service

(Left to right) *C. A. P. Southwell, The President, and J. C. Gridley*

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Personal Notes

B. A. Tunks, formerly manager of the Northern Division of Esso Petroleum Co Ltd, has been appointed Regional Manager (South). He succeeds A. W. Wooldridge, whose appointment as deputy general sales manager was recently announced.

D. D. Campbell, formerly sales manager Northern Division of Esso Petroleum Co Ltd, has been appointed manager, Northern Division.

F. P. Barribal, M.B.E., M.Inst.Pet., general sales manager (Automotive) of the Mobil Oil Company, recently celebrated 30 years service with the Company. To mark the occasion the directors of the Company gave a luncheon in his honour at the Savoy Hotel, London, and presented him with the traditional gift of a pair of inscribed cuff links.

Mr Barribal joined the Company in 1926 and became a salesman in the London area in 1929. He held the position of staff manager from 1934-40 and after the war was appointed manager of the London Automotive Sales Branch. In 1951 he became manager of the Automotive Fuels Department and he was appointed to his present position in 1952.

N. P. W. Moore, has recently been appointed to the position of Reader in Mechanical Engineering in the University of London, tenable at the Imperial College of Science and Technology.

H. Gates and K. Husband have been appointed joint managing directors of the Liverpool Central Oil Company. **J. W. Hall,** who has been the Company's chief chemist for many years, has been appointed a director and **C. Boase,** F.C.A., A.C.I.S., has also been appointed a director and secretary of the Company.

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THE EASTLAKE MEDAL

The Council of the Institute has decided that the next award of the Eastlake Medal shall be to H. Hyams. Details regarding the presentation will be given in due course.

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OBITUARIES

It is with deep regret that we announce the death on 25 February of A. Frank Dabell, a member of the Institute since its foundation and one of those who agreed to become a member prior to its foundation.

He first served the oil industry as chief engineer at the Thames Haven Refinery of the European Petroleum Company, following which he went to Rumania to carry out drilling well work, and in 1904 drilled the first well for oil in Turkey. He then went to Russia and for many years was well known in the Baku and Grosny area. After the Russian Revolution he went to Rumania and thence to Trinidad.

His activities in the Institute included his being the first chairman of both the Rumanian and the Trinidad Branches.

We regret to have to announce the death recently of Dr Francesco Zurlini, Secretary General of Unione Petrolifera of Rome. Dr Zurlini will be remembered by many as a member of the General Organizing Committee of the Fourth World Petroleum Congress and also of the Committee responsible for arranging hotel accommodation, etc.

1907

1926

1956

The U.K. Petroleum Industry—Some Aspects of its Development

By J. W. EYRE

This paper was read to the Institute of Petroleum, London Branch, on 22 September 1955. *Mr Eyre is on the staff of Shell-Mex and BP Ltd.*

Introduction

Today the United Kingdom consumes over 25 million tons a year of petroleum products, including bunkers, in one form or another—that is to say about 85 gallons per head of the population—and yet there must be many an adult person so accustomed to the resultant benefits that he finds it difficult to realize that the properties of petroleum—other than, perhaps, as an illuminant—were virtually unknown in his grandfather's day. Certainly few people, as recently as 50 years ago—unless they possessed the intuition of a Jules Verne or an H. G. Wells—can have foreseen the tremendous influence that petroleum was to have on the life of the nation.

What factors have led to the growth of a vital industry—unthought of a little over one hundred years ago? To answer that question one must first glance at the conditions which prevailed in the U.K. during the early years of the Industrial Revolution.

Early History

At that time Britain was largely an agricultural country; work was carried out for the most part during the hours of daylight, and artificial illumination—when necessary—was provided by torches, tallow-candles (beeswax candles in the case of the nobility and the churches) and waxed reeds—"rush-dips", as they were called—for the working classes.

Such lubrication as was necessary for the primitive machinery of the day was provided by vegetable oils and animal fats. Heat was provided by coal or wood—both of which were in plentiful supply. Transport was by water, by horse, or by "Shanks's pony".

With the continuing development of the industrial era and the advent of the machine age, there was a vast expansion of works and factories which, because of the difficulty of transport, grew up adjacent to coalfields or iron ore deposits. The whole pattern was now changing. Artificial illumination became necessary for the factories, greatly increased quantities of lubricants were needed for the new machines, and new methods of transport were necessary to haul both raw materials and finished goods.

The invention of the railway locomotive solved the problem of transport but the difficulties of lighting and lubrication remained. True, the first gas "batwing" lighting appeared on the London streets as far back as 1817 but this type of illumination was extremely costly owing to the expense of manufacturing and laying the necessary pipes. Oil lamps there were, too, but the cost of the animal and vegetable oils which they burnt was so high—about six shillings per gallon in the middle of the nineteenth century—that their use was confined to the wealthy, whilst candles continued to be the principal means of lighting in the average home.

In so far as lubricants were concerned, supplies of animal fats and vegetable oils were inadequate to meet the increasing demand—in spite of considerable quantities obtained from the whaling industry where, however, the risks were great and prices correspondingly high.

This situation was soon to change, however. In 1848 a Scottish chemist named James Young succeeded in extracting petroleum from an "outcrop" of coal in the Midlands and, two years later, took out two patents. The first of these concerned the extraction of oil from coal, the second the refining of paraffin wax, and it is worth mentioning that some of today's oil refining processes are based on Young's inventions. His activities may well be regarded as the birth of the oil industry in the United Kingdom.

He later extended his processes to shale and afterwards became the founder of the shale oil industry in Scotland—an industry which today employs some 4000 people and which is assisted by the Government by the remission of 1*s.* 3*d.* on the standard rate of tax of 2*s.* 6*d.* per gallon for motor spirit. He was also responsible for introducing the paraffin lamp into countless homes in Britain and this earned him the soubriquet of "Paraffin Young".

Notwithstanding Young's pioneer work, the amount of home-produced petroleum was totally inadequate to meet the increasing demand and it was not until some years later—and then on the other side of the Atlantic—that petroleum became available in worthwhile quantities. In 1859, a certain "Colonel" Edwin Drake sank the first well in Pennsylvania and was fortunate enough to strike oil at a depth of only 69 feet. Within the next twelve months more than 70 other wells had been drilled and petroleum was at last available in commercial quantities. The Oil Age had arrived!

The Main Story

The industry really "got going" in the United Kingdom shortly after commercial production began in America, and petroleum became a widely used product in the late 1860's. At this period, its use was confined mostly to kerosine and lubricating oils—both benzine (as it was called) and fuel oil being regarded largely as waste products.

From the 'sixties to the 'eighties, both kerosine and mineral lubricating oils were imported mainly from the U.S.A. They were transported in wood barrels and, as might be expected, there was considerable loss from leakage. The importers were private brokers who distributed locally on a comparatively small scale. They stored the barrels in their wharves, yards, or warehouses and despatched them to their customers usually by rail, horse-wagon, or by barge—whichever method was the most convenient.

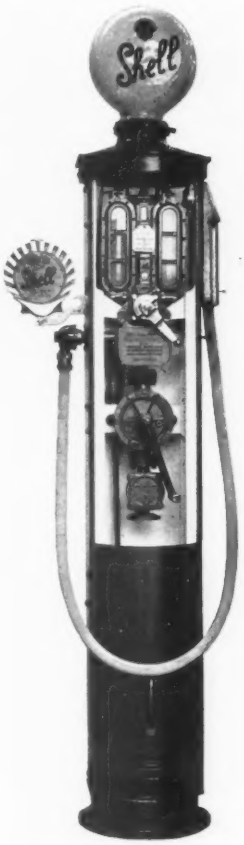
These were prosperous years for the industry with steadily expanding sales as the demand increased for kerosine for lighting purposes.

So ended what might be termed the first phase in the development of the industry.

The next phase in the industry began in 1888 when the Anglo-American Oil Company (a distributing subsidiary of the Standard Oil Corporation of America) was formed in the U.K. It is not surprising that the Americans should have been first in this field when one considers that the greater part of the petroleum imported into the U.K. came from the New World. Up to this time kerosine had been distributed by wholesalers canvassing retailers, who were also the stockists of the lamps which burnt the oil, and who subsequently sold the oil as their own.

The 'nineties proved an eventful decade. Although it is estimated that at the turn of the century there were some ten million paraffin lamps in use, the earlier demand for kerosine was already beginning to decline with the increasing use of gas—and electricity—for domestic lighting, cooking, and heating. At the same time, however, the output of petroleum continued to increase year by year. At about this time a strong competitor to the United States arose in the shape of Russia and by the end of the century a considerable industry had grown up in Baku on the Caspian.

The problem of the trade was now to dispose of the greatly increased production in the face of serious competition from the gas and electricity undertakings, both of which were often able to offer a better service. It is interesting to conjecture what would have happened if this situation had continued. At this time, of course, kerosine and lubricants were still the main products on the market.



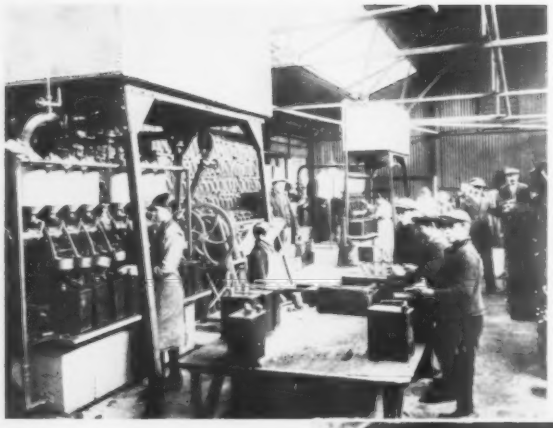
An early Shell pump

By great good fortune, however, the trade was not only to be saved but also given a tremendous boost with the arrival of the horseless carriage. In 1885 the internal combustion engine had been invented by Daimler, Benz, and Butler, and by the early 'nineties had proved itself capable of moving carriages about the roads without the aid of horses. The first motors had appeared on the roads in 1893 and it was found that one of the lighter fractions of petroleum—known as benzine and previously regarded as a waste product—was an admirable fuel for the I.C. engine.

At first many restrictions were placed on the unfortunate owner of the motor car, but, with the introduction of the "Locomotives on Highways Act" in 1896—which removed the stipulation that a motor car should be preceeded by a man on foot and raised the legal speed limit from four to fourteen miles per hour—more motors began to appear on the roads and the business of supplying motor spirit became an important part of the business of the oil distributors. The Anglo-American Oil Company was the first to recognize the possibilities of this new market and their "Pratts" motor spirit made its appearance that same year (1896).

By the end of the century, the quasi-monopoly hitherto enjoyed by the Anglo-American Oil Company was broken up by the entry of Russian oil in the British market. At this time 20 per cent of the oil imported into Britain was Russian, the total imports in 1899 amounting to 157,000 tons of kerosine and 16,000 tons of lubricating oil.

At this point it is appropriate to take a look at some of the other more important companies which were importing oil at this time. These were: The Anglo-Caucasian Oil Com-



(Above) *Can-filling in progress*, 1924

(Right) *Cooperage and barrel filling shed*, 1922-3

pany (largely controlled by the Rothschild interests and dealing principally in Russian kerosine); Meade-King Robinson and Company (dealing in kerosine, lubricating oil, and benzine, and being at one time distributors of "Giant" motor spirit); and The Nobel interests through Bressler, Waechter and Company. These three concerns amalgamated at the beginning of the twentieth century to form The Consolidated Petroleum Company.

At this time (the beginning of the twentieth century) trade continued much as before but with a steady increase in the sales of benzine. Supplies were still delivered mostly in barrels but small cans had been adopted for motor spirit owing to the difficulties involved in decanting from barrels into the tanks of cars.

The Shell Transport and Trading Company had been formed in 1897 and was mainly concerned with the transport and distribution of Russian kerosine in Eastern markets. After a price war with the Royal Dutch—a slightly older company (engaged in production and distribution in the East) and in close connexion with the Rothschild interests, an agreement was reached in 1902 and the Asiatic Petroleum Company was formed to distribute the products of the Royal Dutch—with the aid of the transport of the Shell Group—mainly for trade in Asia.

In Great Britain, the "Shell" interests were represented by The General Petroleum Company, formed in the early 1900's, which did a certain amount of business—mainly in kerosine. It was also the first distributor of "Shell" motor spirit.

In 1906 Shell Transport and the Royal Dutch amalgamated and, in Great Britain, The Consolidated Petroleum Company amalgamated with the General Petroleum Company to form the British Petroleum Company, which thereafter undertook the marketing of "Shell" products.

The Anglo-American Oil Company was now losing ground rapidly to its new rivals, and imports of petroleum from Russia (which was producing 55 per cent of the world's oil in 1901) reached their peak of 117 million gallons in 1903. The distribution of Russian oil in the U.K. brought other firms into existence, one of the most important of these being the Homelight Oil Company.

The formation of Bowrings, which later became the Anglo-Mexican Oil Company and finally amalgamated with the "Shell" Group, also dates back to this period. Another of the older companies was the Gas Lighting Improvement Company (formed in 1888) and afterwards known as the Glico Petroleum Company, which introduced "Carburine" motor spirit to the market. A further name which springs to mind is that of Carless, Capel and Leonard. This concern was founded in 1859 as Carless, Blagdon, and Company and adopted its present trading style in 1873 when the Leonard family became connected with the firm. It was one of the first to realize the importance of the motor vehicle and the need to produce a special fuel to satisfy its needs.

It is reported that in conversation one day with two other oil men, Mr Leonard said he thought "he'd call his stuff 'Petrol'"—which he did—but omitted to register the name, with the result that it after wards became a household word to describe petroleum spirit throughout the U.K. in much the same way as motor spirit is universally called "gas" in the United States.

About this time, following the general growth of industry, the lubricating oil market was also expanding and various firms came into being to distribute lubricating oils, the first in the field being The Vacuum Oil Company (1901)—a subsidiary of the "Standard" interests.

Just before the first world war another company appeared as distributors, mainly of motor spirit. This was The Union Petroleum Products Company—later to be known as the Redline Motor Spirit Company.

The growth of the benzine business led the larger companies in the business to increase their storage and distributing equipment, and two or three of the largest became widely represented all over the country.

Bulk storage at depots was now becoming the normal practice. The oil was brought to the U.K. in ocean tankers and was discharged into waterside installations where it was stored in bulk and afterwards transported in rail cars to inland depots where, in the case of motor spirit, it was then filled into the popular two-gallon cans. Since the products were transported from coastal installations by rail, depots were, of course, situated on railway sidings, the size of the area served by the depot being governed by the distance which

could be covered in one day by a horse-drawn delivery vehicle since this was the method employed to deliver to the customer.

In the years immediately before the first world war, a most important development took place—a demand arose for fuel oil. This was occasioned largely through the foresight of the late Admiral Lord Fisher and Mr (now Sir) Winston Churchill, both of whom were convinced that the future of the British Navy depended upon oil- rather than coal-firing.

As a point of interest, the first flotilla of ocean-going destroyers—wholly dependent upon oil—had been created as far back as 1909 but, owing to intense opposition from many quarters—largely on the ground that coal was produced in the U.K. and oil was not—it was not until 1912 that the Admiralty at last decided to go over wholeheartedly to this new form of power-raising.

The horse-drawn delivery vehicle of the late nineteenth century

The Government then went a step further. In the early part of 1914, in order to safeguard the supplies of fuel oil now so vital to the Navy, it acquired a controlling interest in The Anglo-Persian Oil Company which had been formed in 1909 to develop oil properties in Persia.

First bulk spirit delivery to Edinburgh Corporation, 1920

The following year, in 1915, the British Petroleum Company—in which German capital had been interested—was broken up and ceased to market "Shell" products. Simultaneously, the Shell Marketing Company was formed as a direct subsidiary of the Shell Group and took over the marketing of "Shell products." Two years later the remnants of the British Petroleum Company—and the marketing of BP motor spirit—passed under the control of the Anglo-Persian Oil Co.

The First World War

With the outbreak of war in 1914, the petroleum industry passed under government control. This meant that the Government became the sole importer of petroleum products, which were bought by Government agents—mainly in America.

At this time the Shell Marketing Company, the Anglo-American Oil Company and the British Petroleum Company were by far the biggest distributors of motor spirit in the U.K., and all possessed extensive distributing equipment. In spite of Government control, distribution was still left to the individual companies to whom the trade was allocated on a percentage basis, the Government not only controlling the selling price to the companies but also the price at which the companies might re-sell—thus allowing a fixed amount for distribution and profit.

To avoid waste through needless duplication of equipment,

Modern delivery methods—Shell-Mex and B.P.'s latest 4000-gallon road tanker

the country was split up into areas which were allocated to the various distributors, each having a monopoly in his own particular area. Small towns were usually allocated entirely to one company, the larger towns being divided between various distributors, each covering a different district in the town. This arrangement lasted throughout the war years.

When the industry was finally de-controlled, conditions very quickly returned to normal, although the effects of war-time control were apparent for some considerable time afterwards in the relatively strong hold which individual companies retained in the areas which had previously been allocated to them.

There was, of course, no increase in the ordinary trade in petroleum products in the war years, owing to restrictions on the use of motor vehicles and the consequent decrease in their

An early depot

number. Consumption of motor spirit was still further reduced on the home front as a result of the use of gas and other substitutes—particularly in the case of commercial vehicles. Neither was there any major change in methods of distribution.

On the war-front the position was very different. The war—both on land and in the air—caused increasing demands for petroleum products. Transport lorries, armoured cars, and, afterwards, tanks were all consuming vast quantities and, at the same time, the demand for spirit for aeroplanes was steadily increasing. Lord Curzon often said that "the allies floated to victory on a wave of oil" and there is undoubtedly much evidence in support of his statement.

Command of the world's major oil resources resulted in the allies being able to oppose motor vehicles (which are speedier than horses and less vulnerable than railways) to the more old-fashioned methods of transport employed by the German armies. In the air, too, virtually unlimited supplies of good-quality spirit must also have been of inestimable help against German aeroplanes entirely dependent upon benzole (and frequently poor-quality benzole at that) which rendered them less manoeuvrable and more subject to breakdown.

Probably the most important single factor, however, was the conversion of the fleet from coal to oil-firing. Oil is actually more economical than coal since ships can travel longer distances without refuelling; furthermore they can be refuelled at sea instead of having to return to port for bunkering. It is more economical in manpower—an important consideration in time of war—and, finally, its use results in higher speeds and quicker acceleration. This early development had a considerable effect on the trade generally, more and more ships subsequently adopting oil (in one form or another) as a means of propulsion.

Politically, too, the experiences gained through the use of petroleum products during the first world war caused the governments of the Great Powers to take a much keener interest in the industry than before, through an anxiety to safeguard themselves against a possible shortage in time of war.

The Post-War Period

Shortly after the war, one or two new concerns appeared in the market, including The National Benzole Company which was formed in 1919 by a group of benzole manufacturers anxious to find an outlet for their product on the motor spirit market by mixing it with benzine.

An immense boom occurred in motoring at about this time, which resulted in steadily increasing sales of motor spirit for all the companies. The total number of vehicles in use rose from 390,000 in 1914 to 650,000 in 1920 and there is no doubt that the small family car did much to popularize motoring with "the man in the street".

The great advantage of the motor car over other forms of travel was that it was private. In the past, private travel had been the prerogative of the wealthy who could afford a carriage and even then (for obvious reasons) it was limited to comparatively short distances. Any journey beyond the reasonable staying powers of a horse had to be undertaken in public transport. There was no choice in the matter. The motor car, and particularly the family car, offered opportunity for long-distance private travel and this factor no doubt accounted for a large measure of its popularity.

With the growth of motoring it naturally followed that motorists demanded smoother and better roads. This led to an increasing demand for a good quality surfacing material and, following a period of research and experiment, bitumen became widely used as a surface-dressing during the nineteen-twenties.

The great possibilities of commercial motoring were probably first realized during the railway strike in 1919 and this led many of the larger firms to consider owning their own means of transport. Although the great development of omnibuses did not occur until several years later, these factors all contributed to the prosperity of the petroleum industry.

By this time the two-gallon petrol can—except in congested districts—had been superseded by the (hand-operated) kerbside petrol pump at dealers' sites—the first appeared about 1920—and spirit was distributed by the oil companies by means of bulk lorries. A similar technique—though by no means so extensive in its application—had also been introduced in the case of motor lubricants which were now commonly dispensed from cabinets, the cabinet being virtually a bulk tank with a pump attached.

Apart from spirit, and bitumen for road-surfacing, certain other products came into use during the years between the two wars. Chief amongst these was probably derv fuel, which was introduced in the late nineteen-twenties to meet the needs of diesel-engined road vehicles.

Hitherto the diesel (or compression-ignition) engine had been employed only as a stationary unit and it was not until 1928 that it first began to be used as an alternative to the petrol engine in road vehicles, mainly of the heavy goods type. Later, its use was extended to public transport and, still more recently, to much smaller vehicles, including taxi-cabs—many of the London taxis being equipped today with this type of engine.

It was also at about this time that oil first started to be used for the central-heating of private houses.

During the nineteen-thirties both fuel and diesel oil made considerable strides and consumption was well over 1,000,000 tons per annum by 1938, notwithstanding the 1*d.* per gallon tax which had been put on in 1933 with the object of making it difficult to compete with coal.

The Second World War

By the autumn of 1939 Great Britain was again at war, but however unprepared she may have been in other respects, no such accusation can be made in respect of the oil industry.

As a result of discussion between leading groups in the industry and following consultations with the Ministries concerned and the Services, plans had been made during 1938 for the formation of an organization capable of undertaking the prodigious task of handling the importation and distribution of vital oil supplies throughout the British Isles in the event of a national emergency. This unique body was known as the Petroleum Board and it came into operation as soon as war was declared.

Established practices in the industry were at once thrown overboard; in the case of spirit, kerosine, and derv all competition ceased and the entire physical resources of the industry, including storage, vehicles, and equipment were merged into a common "pool" without regard to individual ownership. The personnel of the various companies also passed under the control of the Board, and, for the next few years, were united in a common effort.

The Petroleum Board, which was manned at all levels by members of the industry, was not a statutory body dependent upon any rigid agreement with the Government; it operated on a basis of day-to-day contact in order to achieve the necessary flexibility called for in the swiftly changing circumstances. It was, in fact, an executive body which whilst working under government supervision nevertheless enjoyed sufficient freedom to operate on commercial lines as far as this was possible in the circumstances.

The Board had its headquarters in London and the whole country was split up into regions each under the control of a manager. Under the Petroleum Board, only one "pool" grade of each type of product was sold, and rationing—as in the case of "pool" motor spirit—was not (in spite of a widespread belief at the time) imposed by the Board, but by the Government, the Petroleum Board, however, being responsible for the necessary arrangements and collection.

An important off-shoot of the Petroleum Board was the Lubricating Oil Pool. This was an importer's pool having its own administration and operating as a completely separate entity in close association with the Petroleum Board. Its job was to import and sell lubricating oils on a wholesale basis to some 500 distributors and, for this purpose, members pooled their storage tankage, vehicles, and oil stocks.

The problems confronting the Petroleum Board were immense. In normal times 52 per cent of the United Kingdom's oil imports were handled on the East Coast (including 32 per cent in the Thames Estuary) and 10 per cent were handled on the South Coast; whilst the balance came through West Coast installations. Owing to the vulnerability of the East and South Coast ports, the entire intake of petroleum had to be diverted to the West, which had a capacity to handle only some 38 per cent.

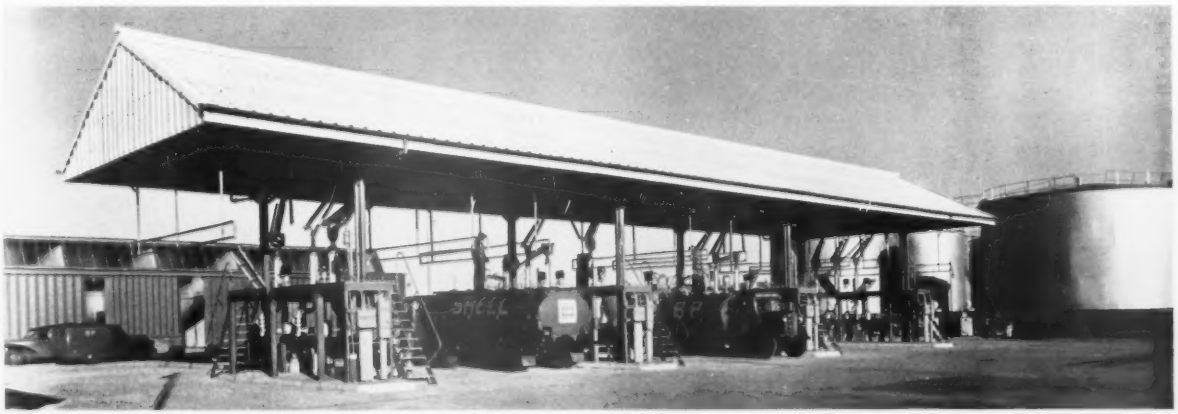
As may be imagined, such a change-over involved extraordinary difficulties, for not only was it necessary to ensure a quick turn round of the enormously increased volume of shipping, but also to distribute the oil overland to those points where it was still needed in large quantities and would normally have been brought in direct.

The difficulty of distribution was overcome by the laying of over 1000 miles of pipeline to various receiving centres and these lines carried some 4½ million tons of products during 1944. The U.K. Pipeline System—as it was called—also incorporated an Aviation Circuit which supplied aviation spirit to the various airfields of Bomber Command.

It may truthfully be said that the Petroleum Board measured up in every way to the task it had been set. Not only did it maintain essential supplies throughout constant aerial bombardment, with resultant loss or damage to vital installations and other facilities, but it also did much in other ways to assist the war effort. In 1945, in a letter to the Chairman of the Board, the Minister of Fuel and Power paid high tribute to its work throughout the war years. So ended a notable chapter in the history of the industry in the United Kingdom, but it was not until 1948 that the Board was finally dissolved, by which time organized plans had been completed for a resumption of marketing by individual companies.

For some time afterwards, however, normal activities were hampered, firstly by the continuance of the rationing scheme,

Shell-Mex and B.P.'s latest depot at Great Yarmouth



which was not abolished until May 1950, and, secondly, it was not until February 1953 that "Pool" motor spirit finally disappeared from the scene and companies were at last permitted to offer the public their own high-quality branded fuels.

This introduced an era of intense competition coupled with the need to re-educate the motoring public in the advantages offered by a free choice of high-grade motor spirit.

For some time past, all motor spirit had contained a proportion of lead and now companies began to introduce other and new types of chemical additive in order to provide better performance and to reduce engine wear. The success of this campaign is evident from the fact that today spirit consumption by private cars and motor cycles is represented by 87 per cent premier grade as against only 13 per cent of second grade.

The Lubricating Oil Market

As already indicated, when reference was made to the Lubricating Oil Pool, the lubricating oil market differs considerably from the pattern for motor spirit.

Lubricating oil is distributed in the U.K. market in two ways. Firstly, there is direct distribution by the producing companies in all fields of lubrication. These companies market lubricating oils under their own brand names. Secondly, there is what is known as the "wholesale" market. This is fed from two distinct sources:

(*a*) by a surplus from the producing companies over and above their own selling requirements, and

(*b*) by supplies imported by the U.K. representatives of foreign lubricating oil refiners who do not participate in the U.K. motor spirit market.

It will be seen, therefore, that the wholesale market is fed both by producers and importers, the greater part of this trade being in the hands of some 15 companies. In turn, these 15 companies are engaged in offering wholesale supplies to some 500 distributors. These vary in size from the big nationally-known organizations—a few of which also carry on an export trade—to a large number of small local concerns, some of which specialize in certain types of lubricants and markets, whilst others may engage simultaneously in ancillary trades such as grease, soap, industrial compounds, paint, and so on.

The Post-War Years

With the return to peacetime conditions, the industry found itself faced with a greatly increased demand for many petroleum products. By 1948 the total U.K. inland consumption was 12½ million tons as compared with 9 million tons in 1938, and there was every indication that this would go on steadily increasing.

The big increases were in inland fuel oil (including gas oil) and in vaporizing oil for use in farm tractors, the number of which had increased tremendously as a result of the country's food drive during the war.

Increases had also taken place in bunker fuel for ships, in bitumen for roads and airfields, and in lubricants for industrial purposes. Against this, however, there had been a considerable run-down of capital equipment in the industry and the facilities available were all based on a marketing policy laid down ten years previously.

In short, the whole system of importation, storage, and distribution was hopelessly outdated. This prompted the big oil companies to make a bold decision and, instead of trying to revert to the pre-war pattern, they decided to plan an entirely new distribution system.

Before the war it had been the established practice to import about 80 per cent of petroleum already refined. Such cargoes were discharged into ocean installations and subsequently transported, largely by rail, to a network of inland depots whence they were finally delivered to the customer in the companies' vehicles.

After the war, however, with the emergence of the Middle East as a great producing centre—coupled with the acute need to reduce dollar expenditure—it was decided, with the approval of the Government, to embark on an impressive programme of refinery construction which would raise the refining capacity of the U.K. from its pre-war level of about 3½ million tons to its present level of 28 million tons. Other factors contributing to this decision were the desire to employ indigenous labour and the rapid growth of a chemical industry based on petroleum.

At the same time the major distributing companies decided that the success of present day distribution and the ability to maintain motor spirit prices at a reasonable level depended to a great extent upon the efficient operation of the retail garage site.

After the 1914-18 war, and as a result of the rapid growth of motoring, the number of garages grew apace and, as many were originally financed with too little capital, the premises, in many cases, left much to be desired.

With the arrival of the kerbside pump and underground tank—as an alternative to two-gallon cans—in the 1920's, each oil company strove to secure as many outlets as possible in the shape of pumps bearing its branded globe. As a result many garages soon acquired a series of pumps jostling each other, often in a very confined space and each with a limited storage capacity below ground. Deliveries to the pumps were small—and consequently frequent—and often involved considerable distances for the delivery lorry. Furthermore, upon arrival at the garage, lorries got in each other's way and in the way of the motorist owing to the cramped conditions.

In 1951 the companies began to negotiate agreements with individual garage and service station proprietors whereby the latter—in return for certain assistance on the part of the company—undertook to limit the sale of motor spirit exclusively to the brands sponsored by the particular company involved. This policy, in conjunction with the introduction of larger bulk delivery vehicles (some today have a carrying capacity of 4000 gallons), has led to bigger and therefore less frequent deliveries—resulting in higher productivity in terms of the number of gallons handled per driver per annum.

In many cases dealers have received financial assistance from the companies to enable them to improve their stations, by providing better forecourt layouts and other amenities. Additional features of such agreements include the training of staff and so on.

Up to the present time, nine out of every ten sites with two or more pumps have entered into an exclusive agreement with one or other of the oil companies.

In considering the past it is, perhaps, inevitable that one should deal at some length with the motor spirit market, since that has been, for many years, the main outlet for petroleum products in the United Kingdom. It is, however, in the wider use of petroleum products in industry—in particular as fuels for industry—that the most striking post-war developments have taken place.

The major task now facing the industry is the extension of its contribution towards the country's energy needs, since only by this means can any real improvement in our present standard of living be brought about in the years immediately ahead.

Around the Branches

BAHRAIN, FAWLEY, KUWAIT, LONDON, NORTHERN, SCOTTISH, SOUTH-EASTERN, SOUTH WALES, STANLOW, TRINIDAD

Bahrain Branch

The eleventh meeting of the Branch was held on 16 January, when the guest speaker was H. M. Brown, reservoir engineer for Aramco, who gave a paper entitled "Abqaiq Gas Injection Gravity Drainage-Reservoir Considerations".

This was the first paper that had been given on the Abqaiq field, and it was of particular interest because of the greater use of gas injection during the past few years for increasing the production from oil fields. Among the distinguished visitors at the meeting were F. E. Wellings, chief geologist and general manager of the Production and Operating Department of I.P.C., H. R. Lovely, chief petroleum engineer of I.P.C., P. R. A. Ensor, general manager of Q.P.C., and J. P. Callegeros, senior development engineer of Aramco.

Mr Brown said that the Abqaiq field was discovered in 1941, but it was not until 1946 that there was any large-scale production from the field. With the sustained high production rates there was a rapid decline in the pressure of the field, indicating that the oil was undersaturated. There was some influx of water to the field, but it was of the order of 100,000 barrels per day and, therefore, insufficient to prevent the pressure from dropping. When the pressure had dropped to the bubble-point of the crude there was an increase in the gas-oil ratio of some of the producing wells. Since this reduced the potential production of the field with the existing wells, and also reduced the ultimate recovery of oil, it was decided that it would be necessary to prevent a further pressure decline.

Mr Brown said that, after several methods had been considered, the decision was made to employ gas injection. This method was selected not only for economic reasons, but also because it conserved gas that would otherwise be flared. He also stated that there was natural gravity drainage in the field which was desirable when using gas injection.

Mr Brown then went on to discuss the recent theory that had been developed for estimating the economics of gas injection, and concluded his talk with a general description of the application of this theory to the study of the Abqaiq field.

A lively discussion period followed in which a number of questions were ably answered by Mr Brown.

Before the meeting was closed, a vote of thanks was proposed by A. H. R. Grimsey to the speaker for his interesting paper.

Fawley Branch

A meeting of the Branch was held on 13 January when R. K. Dickie, of the British Petroleum Company, spoke on the "Drilling and Production of Crude Oil".

Mr Dickie began his talk by describing the formation of oil and the types of strata which could hold oil and gas in underground reservoirs. He then gave a brief description of the operation of a drilling derrick.

He described the use of drilling mud and showed that it required several important qualities. Among these were—first, that it should be of a specific gravity high enough to hold back the pressure of any underground stream, and secondly, that in the event of coming

The London Branch repeat Film Show on 4 February, in spite of inclement weather, almost filled the cinema at Shell-Mex House (left). *After the show, a re-fuelling session, as seen below, was much appreciated by one and all, thanks to the hospitality of Shell-Mex and BP Ltd.*

Photos by G. Sell

against a porous strata it should form an impervious skin so as to avoid complete loss of liquid from the hole. Mr Dickie explained how the mud brought up the cuttings from the drill-head and how, after filtering the cuttings from the mud, samples were taken for the geologist.

He went on to explain that although the cuttings gave the geologist a good idea of the various strata being drilled it was necessary from time to time to obtain solid samples of the strata by means of the coring bit. He mentioned very briefly electrical logging, which is used to some extent as a substitute for coring.

The speaker then explained that the mud could be used only to a limited extent to retain the walls of the hole and that it was necessary to place steel casing to be certain of controlling any situation. Depending upon the depth and the drilling conditions it was frequently necessary to run more than one casing.

Mr Dickie then went on to describe various types of drilling derricks starting with percussion and finishing with the modern mast type derrick. He then described the use of the oilfield truck for moving equipment.

Next, the speaker showed that the flow of oil into the bottom of the well presented problems. Some formations were so dense that it was necessary to make them porous by means of chemicals such as hydrochloric acid. On the other hand, friable sand formations needed holding back and it was customary to cement the casing right through the formation and then use a special type of gun which shot numerous holes through casing and cement.

Mr Dickie went on to describe the movement of oil and gas from the well and showed that as the oil rose from the depth the pressure was reduced and gas was released with resultant high rates of flow. He said that older wells which were without sufficient natural pressure to bring the oil to the surface required boosting. The two methods used were—first, the injection of gas to reduce the gravity of the oil in the casing and, secondly, the use of a rod pump for positive displacement.

After describing some of the methods of separating gas and water from oil, Mr Dickie finished his lecture by describing the means of controlling production and showed that by drilling to various levels and taking samples it was possible to estimate how the field was becoming depleted and how from these observations it was possible to redistribute the production to balance the field.

The lecture, which was well illustrated with slides, was obviously one of interest to the audience and Dr Pearce found it necessary to draw the meeting to a close for lack of time.

Mr Brooks proposed the vote of thanks to the speaker.

There is no doubt that the leaders in the London Branch debate took their task with seriousness. Top left *we have A. W. Deller proposing the motion, and next Geoffrey Barrett seconding it.* Top right, *J. C. Jukes leads for the rejection of the motion, while A. J. Goodfellow* (seated), *who seconded the rejection, listens intently. The audience was equally intent in their consideration of the points raised, as will be seen from the two lower pictures.*

London Branch

The Branch held a dinner-debate on 19 January at the Chatham Rooms Restaurant, Victoria Station. Members assembled for cocktails at 6.0 p.m. and the dinner, which was completely informal, commenced at 6.30 and consisted of a very enjoyable menu, which had intimate petroleum connexions and was enjoyed by all.

The menu consisted of:—

ON STREAM WITH
Crème Solferino molto detergento

Fillet of Sole Bonne Femme sur Platformer

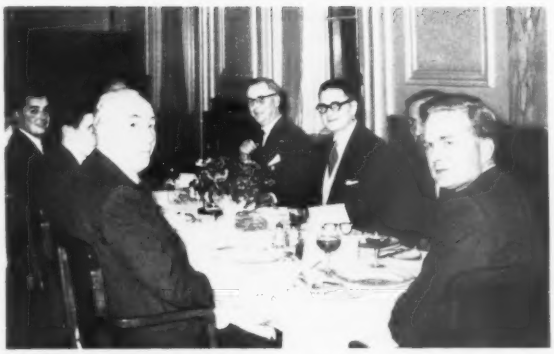
Roast Chicken de-asphalted
Bread Sauce Thixotropic
Parmentier Potatoes propane treated
Peas catalytic

Coupe Jacques avec anti-freeze

Coffee high octane

After the dinner, there was a short break during which the tables were re-arranged for the debate which followed. The motion "This House regrets the discovery of Petroleum" was proposed by A. W. Deller and seconded by G. Barrett, whilst the opposition viewpoint was ably expressed by J. C. Jukes, supported by A. J. Goodfellow.

Following the main speakers,



Chairman's table at the dinner which preceded the London Branch debate on 19 January.

there were enthusiastic contributions from the floor in a mainly humorous vein. It would be difficult and invidious to attempt to single out particular speakers, all of whom contributed to the enjoyment of the meeting. The motion was carried by a large majority.

The Branch owes its thanks to George Sell who, as always at its social functions, was well to the fore with his camera.

Scottish Branch

A meeting of the Branch was held in the premises of the Institute of Chartered Accountants, Glasgow, on 14 February.

J. M. Caldwell, J.P., President of the Branch, who presided, said he was pleased to see a large audience, and gave a special welcome to the members of the staff of Babcock & Wilcox and to the chemical engineering students who were present. Introducing the speaker, T. B. Webb, Mr Caldwell said that Mr Webb was in charge of research and development for Babcock & Wilcox. Welding had come to be of great importance to the oil industry and his address on "The design and manufacture of welded pressure vessels" would be of particular interest.

Mr Webb began by dealing with the processes involved in the manufacture of vessels, illustrating them by a short film and lantern slides. He then considered the value of research work in the designing of vessels and spoke of the problems of stress raisers. Mr Webb concluded by answering a large number of questions and was accorded a very hearty vote of thanks.

South-Eastern Branch

An event of particular scientific importance took place on 7 February, at the Medway College of Technology, when, at a meeting arranged jointly by the Branch and the Southern Section of the Royal Institute of Chemistry, scientists of all ages from the district heard the secrets of atomic energy explained to them by one of Harwell's "back-room boys"—I. Wells, B.Sc., M.I.Chem.E.

So large, indeed, was the audience that many of the late-comers were obliged to stand at the side of the lecture theatre, which had been kindly loaned by the Principal of the College. However, all present would agree that the lecture they heard was not only informative but thrilling in the insight it gave into the great potentialities of atomic power in the future.

In an easy but masterly manner Mr Wells surveyed, with the aid of slides, some of the technicalities of this vast new project, emphasizing in particular the chemical processes.

After the lecture Mr Wells answered most ably the many complex questions presented to him by his listeners, and the overall effect was stimulating and extremely encouraging to all who were present.

A vote of thanks to Mr Wells was proposed by the Chairman of the South-Eastern Branch of the Institute of Petroleum, Dr Carruthers, and this was seconded by the Chairman of the Royal Institute of Chemistry. The audience also showed its very great appreciation.

Presentation to Noel Grey

At a recent committee meeting of the South-Eastern Branch, an engraved cup was presented to Noel Grey in recognition of his services as chairman of the Branch, a position which he relinquished in the previous autumn.

Dr J. E. Carruthers, the present chairman, in making the presentation, said that he and his fellow committee members greatly regretted Mr Grey's decision to vacate the chair of the Branch but were very pleased that he had agreed to continue to give his services as a committee member. Mr Grey had played a very large part in establishing the South-Eastern Branch and was its founder

N. W. Grey and (right) *a close-up of the tankard*

chairman. The Branch membership was now well over 200 and was still increasing.

In accepting the gift, Mr Grey paid a tribute to the members of the original Branch Committee—A.Chatting, W. A. Groves, R. D. Haywood, W. H. Lilly, F. A. Maliphant, F. W. Martin, S. H. Philpot, and F. H. Sanderson—who had done so much to get the Branch going. He expressed his best wishes for the continued success of the Branch and, after the cup had been filled with appropriate liquid, it was duly circulated.

Trinidad Branch

A general meeting of the Branch was held on 8 October, 1955, when a tour was made of the factory of Trinidad Portland Cement Limited at Claxton Bay. The manager,

F. Johnson, and several staff members gave a most interesting and instructive survey of the process of cement making. This factory, a member of the Rugby Cement Company group, operates on limestone of approximately 80 per cent $CaCO_3$ content, which is conveyed six miles by a cable railway from the quarry to the factory. There it is ground, water, sand, and clay are added, and the slurry is continuously injected under carefully controlled conditions into the kiln, which is fired with oil pumped several miles from the Trinidad Leaseholds Limited refinery at Pointe-a-Pierre. The Trinidad clay appears to have a very beneficial property in controlling the ball size of the clinker formed in the firing process. The clinker is ground, gypsum added, and the finished cement is blown to the storage hoppers. The operation of an ingenious bag loading machine was demonstrated, and a visit was made to the laboratories.

★ ★ ★

U.K. Petroleum Trade in 1955

The United Kingdom imports of crude petroleum and liquid petroleum products totalled 9,498·5 million gallons in 1955, an increase of approximately 470 million gallons, or 5·2 per cent over the total for 1954. The corresponding increase in CIF value was 7·3 per cent, or £22,333,326.

From Table I, which is extracted from the official preliminary report*, it will be noted that in the case of crude oil there was very little change in quantity or in value. In the

* "Accounts relating to Trade and Navigation of the United Kingdom, December 1955". London, HMSO, 12*s*. 6*d*.

TABLE I
QUANTITY AND VALUE OF U.K. PETROLEUM IMPORTS

	1955		1954		1953	
	Quantity 1000 *gal.*	*Value* £	*Quantity* 1000 *gal.*	*Value* £	*Quantity* 1000 *gal.*	*Value* £
Crude petroleum:						
Full and topped crudes	6,849,498	208,823,920	7,271,396	224,037,319	6,693,693	220,637,468
Other*	379,448	15,702,034				
	7,228,946	224,525,954	7,271,396	224,037,319	6,693,693	220,637,468
Refined petroleum:						
Motor spirit	557,853	31,457,568	425,330	25,363,218	497,461	32,313,684
Other spirit	33,414	2,276,963	45,951	2,817,542	82,380	4,762,655
Kerosine	429,387	19,942,165	359,830	16,918,194	384,478	19,215,347
Gas oil	509,132	23,168,762	372,543	16,758,389	272,774	12,543,994
Diesel oil	58,891	2,518,137	52,910	2,038,349	57,740	2,363,409
Fuel oil	569,617	16,831,444	385,664	10,633,221	227,379	6,367,466
Lubricating and other heavy oils	111,308	8,962,871	114,573	8,784,306	111,360	9,224,134
Total	9,498,548	329,683,864	9,028,197	307,350,538	8,327,265	307,428,157
	Cwt	£	*Cwt*	£	*Cwt*	£
Lubricating greases and compounds (including cable impregnating compounds)	19,564	203,633	7,561	112,248	6,748	118,544
Petrolatum	222,127	652,808	155,499	472,320	183,494	499,910
Waxes:						
Paraffin wax	752,330	2,628,606	804,508	2,864,866	285,038	897,764
Other petroleum wax	152,684	715,208	155,151	665,347	90,003	415,873
Montan and ozokerite	8,424	62,842	7,449	44,390	3,795	29,221
All other refined petroleum products, not elsewhere specified, and pitch (excluding natural asphalt and bitumen)	—	1,745,188	—	482,493	—	595,161
Total	—	335,692,149	—	311,992,202	—	309,984,630

* Includes refinery fuel but excludes unfinished oils for blending.

TABLE II

PERCENTAGE IMPORTS OF PETROLEUM INTO THE U.K.

	1955	1954	1953
	Per cent		
Crude petroleum	76·1	80·1	80·3
Motor spirit	5·9	4·8	6·0
Other spirit	0·4	0·6	0·9
Kerosine	4·5	4·0	4·6
Gas oil	5·4	4·2	3·3
Diesel oil	0·6	0·6	0·7
Fuel oil	5·9	4·3	2·8
Lubricating oil	1·2	1·4	1·4
	100·0	100·0	100·0

return, a slight change has been made in the method of recording entries, and what is now termed as "full and topped" crude was that previously included as the total crude oil import. The "other" crude in the 1955 official return† appears to relate to the item for refinery feed previously included under gas oil.

In regard to liquid refined products, there are some increases in quantity which are worthy of note. Thus, motor spirit imports increased by 31·1 per cent, kerosine by 19·3 per cent, gas oil by 36·7 per cent, and fuel oil by 47·7 per cent. These changes are also seen in Table II, which records crude oil and liquid products as percentages of the total import.

Table III sets out the average CIF values of the various imports calculated on a unit basis. In general, for the liquid

† See *IP Review* 1955, page 69.

TABLE III

AVERAGE CIF UNIT VALUES OF U.K. PETROLEUM IMPORTS

	1955	1954	1953
	£ *per* 1000 *gal.*		
Crude petroleum	31·06	30·70	32·96
Motor spirit	56·39	59·40	64·95
Other spirit	68·14	61·31	57·81
Kerosine	46·44	47·01	49·98
Gas oil	45·51	44·98	45·98
Diesel oil	42·76	38·53	40·93
Fuel oil	29·54	27·57	28·00
Lubricating oil	80·52	76·67	82·83
	£ *per cwt*		
Lubricating greases and compounds	10·41	14·85	17·56
Petrolatum	2·94	3·04	2·72
Paraffin wax	3·49	3·56	3·15
Other petroleum wax	4·69	4·29	4·62
Montan and earth wax	7·46	5·96	7·75

TABLE IV

COUNTRIES CONSIGNING PETROLEUM TO THE U.K.

Country and Product	1955	1954	1953
	Thousand gallons		
KUWAIT:			
Crude petroleum	4,211,455	4,562,821	4,042,011
IRAQ:			
Crude petroleum	1,001,283	1,338,691	1,672,252
VENEZUELA:			
Crude petroleum	617,841	414,461	221,434
Motor spirit	—	—	464
Kerosine	63,306	17,221	16,623
Gas, diesel, and fuel oils	158,681	60,413	42,245
	839,828	492,095	280,766
NETHERLANDS ANTILLES:			
Crude petroleum	248,940	302,142	193,815
Motor spirit	123,569	76,440	101,173
Kerosine	175,245	195,535	205,106
Gas, diesel, and fuel oils	182,391	211,836	110,470
Lubricating oil	18,667	14,469	19,385
	748,812	800,422	629,949
BAHREIN, QATAR, AND TRUCIAL OMAN:			
Crude petroleum	429,093	379,728	412,391
Motor spirit	66,683	50,882	41,773
Kerosine	26,980	8,457	11,458
Gas, diesel, and fuel oils	51,280	25,969	17,100
	574,036	465,036	482,722
NETHERLANDS:			
Crude petroleum	94,280	10,993	9,103
Motor spirit	67,224	94,105	114,428
Kerosine	32,264	39,254	30,233
Gas, diesel, and fuel oils	216,626	114,434	40,544
Lubricating oil	4,923	4,639	4,511
	415,317	263,425	198,819
TRINIDAD:			
Motor spirit	134,766	125,584	121,437
Kerosine	64,269	78,466	99,614
Gas, diesel, and fuel oils	173,285	129,404	124,836
	372,320	333,454	345,887
UNITED STATES OF AMERICA:			
Crude petroleum	16,301	36,963	45,611
Motor spirit	57,995	52,129	88,048
Kerosine	10,260	9,292	14,045
Gas, diesel, and fuel oils	206,258	180,719	180,508
Lubricating oil	60,735	77,675	74,872
	351,549	356,778	403,084

TABLE IV—*continued*

Country and Product	1955	1954	1953
	Thousand gallons		
FRANCE:			
Motor spirit	26,283	9,922	8,281
Gas, diesel, and fuel oils	91,040	34,404	24,196
	117,323	44,326	32,477
SAUDI ARABIA:			
Crude petroleum	90,456	40,542	58,508
PERU:			
Crude petroleum	30,810	35,673	30,176
BELGIUM:			
Motor spirit	2,202	2,002	15,456
Gas, diesel, and fuel oils	1,845	1,780	15,111
	4,047	3,782	30,567
WESTERN GERMANY:			
Motor spirit	649	1,494	4,860
OTHER COMMONWEALTH COUNTRIES AND IRISH REPUBLIC:			
Crude petroleum	105,289	109,946	6,135
Motor spirit	33,816	3,662	272
Kerosine	28,601	157	189
Gas, diesel, and fuel oils	10,752	3,078	1,308
Lubricating oil	423	382	338
	178,881	117,225	8,242
OTHER FOREIGN COUNTRIES:			
Crude petroleum	383,198	39,436	2,257
Motor spirit	44,666	9,110	1,733
Kerosine	28,462	11,448	7,210
Gas, diesel, and fuel oils	45,482	49,080	1,575
Lubricating oil	26,560	17,408	12,254
	528,368	126,482	25,029

products there are indications of a rise in value, with the exception of kerosine, which showed a slight decline.

As regards countries of consignment, which, it must be emphasized, are not necessarily the countries of origin or manufacture, the details set out in Table IV show that Kuwait, whence only crude oil is imported to the United Kingdom, continued to occupy the leading position. Venezuela, with a very high increase in its exports to the U.K., took third place to replace the Netherlands West Indies. Another change in order was in regard to the Netherlands and Trinidad, the former occupying sixth place and the latter seventh place, both now exceeding the United States, which dropped to eighth place.

Details of the imports on a regional basis are given in Table V and it is noted that while there was a considerable decline in the percentage obtained from the Middle East

TABLE V

U.K. PETROLEUM IMPORTS BY ZONES OF CONSIGNMENT

	1955		1954		1953	
	Mil. gal.	*% of total*	*Mil. gal.*	*% of total*	*Mil. gal.*	*% of total*
Middle East	5,877	62·0	6,407	71·3	6,255	75·8
Caribbean and Peru	1,992	21·1	1,662	18·6	1,287	15·6
United States	352	3·8	357	3·9	403	4·9
Europe	537	5·6	313	3·5	267	3·2
Undisclosed areas	707	7·5	244	2·7	33	0·5

there were correspondingly slight increases in regard to the Caribbean, Peru, and Europe. In view of the large quantities included under other Commonwealth countries and other foreign countries it is possible that these percentages may be materially changed when the final return comes to hand.

Re-exports

Meanwhile it would appear that Europe is tending to become a larger supplier of petroleum and its products to the United Kingdom than the U.S.A. Thus, it will be noted from Table IV that both the Netherlands and France increased their exports to the U.K. in 1955 to a considerable extent in comparison with 1954.

Table VI gives details of the comparatively small quantities of imported petroleum products which are re-exported from the U.K. In addition to these figures it should be noted that in 1955 a total of 965,481,000 gallons of oil fuel was taken on board vessels engaged in the foreign trade, including fishing vessels, the corresponding total for 1954 being 912,725,000 gallons. Of the 1955 amount, 698,484,000 gallons was used on vessels under the British flag.

Exports of Home Produced Oil

The 1955 exports of home produced liquid petroleum products were somewhat lower than in 1954, the corresponding figures being 1541 million gallons in 1955 and 1911 million gallons in 1954. As regards the solid or semi-solid products, these were slightly higher than in the previous year and full details are given in Table VII.

Average unit values, in pounds sterling per 1000 gallons, for these exports were: motor spirit £52·7 (£51·6 in 1954); kerosine £47·4 (£47·3); gas oil £43 (£41); diesel oil £40·5 (£38·3); fuel oil £28·1 (£26·7); lubricating oil £159·4 (£157·4); in £ per cwt: lubricating greases £3·9 (£3·8); in £ per ton: bituminous asphalts £22·6 (£23·9); pitch £10·4 (£10·6).

TABLE VI

U.K. RE-EXPORTS OF IMPORTED PETROLEUM

	1955	1954	1953
	Thousand gallons		
Motor spirit	11,895	10,983	5,483
Kerosine	988	3,115	8,233
Gas, diesel, and fuel oils	38,076	38,682	7,477

TABLE VII

U.K. EXPORTS OF HOME-PRODUCED AND HOME-MANUFACTURED PETROLEUM

	1955		1954		1953	
	Quantity 1000 *gal.*	*Value* £	*Quantity* 1000 *gal.*	*Value* £	*Quantity* 1000 *gal.*	*Value* £
Motor spirit	385,155	20,296,665	448,927	23,158,924	310,955	16,013,066
Other spirit	6,626	591,209	8,773	656,845	16,730	909,625
Kerosine	55,830	2,639,014	59,574	2,815,830	41,096	2,090,969
Gas oil	239,300	10,285,516	250,294	10,264,813	250,740	10,673,821
Diesel oil	103,480	4,198,219	108,072	4,142,646	136,079	5,012,071
Fuel oil	665,312	18,674,904	974,447	26,051,727	1,018,485	28,262,000
Lubricating oil	85,340	13,608,592	60,515	9,530,086	45,423	7,343,339
	1,541,043	70,314,119	1,910,602	76,620,871	1,819,508	70,304,891
	Cwt		*Cwt*		*Cwt*	
Lubricating greases and compounds (including cable impregnating compound)	459,385	1,782,554	349,843	1,316,424	271,599	1,079,071
	Tons		*Tons*		*Tons*	
Bituminous asphalts (manufactured) and emulsions (other than for use as paint)	74,004	1,676,962	67,007	1,601,877	49,898	1,337,292
Pitch (other than natural asphalt and bitumen)	226,534	2,353,951	259,492	2,762,054	268,109	3,146,277
All other refined petroleum products, not elsewhere specified, and crude petroleum	—	1,468,338	—	1,904,843	—	919,304
Total	—	77,575,924	—	84,206,069	—	76,786,835

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Petroleum in Parliament

Power Station Fuels

At Question Time in the House on 30 January Mr Awbery asked the Minister of Fuel and Power the difference in the cost of generating power by coal and oil; how many power stations were using coal and oil, respectively, for steam-raising purposes; and what research he had undertaken into methods of changing quickly from one system to another if the necessity arose.

Mr Aubrey Jones said in reply that at present 227 stations were burning coal and two oil. The latter, and the further fifteen stations which by 1960 will be equipped to burn oil, are geographically well-placed to receive oil supplies in bulk; in these cases, under existing agreements between the Central Electricity Authority and their oil suppliers, the difference in cost of generation as compared with coal was marginal. Most of these stations would be able to revert to coal burning in periods varying between a few days and about six weeks.

Natural Gas in the U.K.

At Question Time in the House on 13 February, Mr A. Roberts asked the Minister of Fuel and Power what success had been achieved in the exploration for natural gas in Great Britain, and whether the search was being intensified.

In reply, Mr Aubrey Jones said that at Cousland in Midlothian and Heathfield in Sussex, where the presence of gas had been known for many years, the trial wells had not so far yielded gas in quantities sufficient for commercial production. Two wells in Ashdown Forest had similarly yielded only small quantities of gas. Attention was at present being concentrated chiefly on Yorkshire where work had begun on a deep well at Hunmanby, north-west of Bridlington.

The programme set out for itself by the Gas Council was a five-year programme, said Mr Jones. Since only between two and three years had elapsed it was premature to draw final conclusions.

Use of Oil in the U.K.

Asked in the House to what extent oil was being used to make up the deficiency between coal production and demand, Mr Aubrey Jones said that in 1955 total inland consumption of fuel amounted to 250 million tons of coal equivalent. Of that, over 214 million tons was met by coal and nearly a million by hydro-electricity. The deficiency of 35 million tons was met by oil.

Books and Films

Materials Handling and Work Study Data

The College of Production Technology at Charing, Ashford, Kent, which holds both residential and evening courses in work study and materials handling, has recently published a set of study papers on these subjects. The papers were prepared for use as reference notes by executives attending the courses but it is thought that they will be of general interest and usefulness and they have therefore been made available to the public on application to the college.

The set dealing with materials handling consists of nine papers: Introduction to Materials Handling—Basic Principles and Considerations; Factory Planning and Layout of New Factories; Basic Equipment—Conveyors, Elevators, Hoists, and Cranes; Basic Equipment—Industrial Trucks, Palletization; Co-ordination of Materials Handling with Production; Factors Affecting Choice of Equipment; Stores and Stores Handling; Economic Analysis; Case Studies.

The set on work study comprises: Definition and Scope Survey; Method Study; Work Measurement; Incentives; Economic Analysis.

"The Way to Understanding"

A series of articles by George Schwartz which appeared quarterly in the *Esso Magazine* aroused such considerable interest that they have now been reprinted by the Esso Petroleum Company in booklet form under the title "The Way to Understanding".

The booklet gives an introductory sketch of the economic system and of the basic principles which govern the economic life of the Western world. In one article Mr Schwartz poses the question "who runs the economic system?" and goes on to show how the "real boss" of the system is the individual consumer.

In concluding articles Mr Schwartz considers the complementary roles of wage earners and risk-takers, and discusses the application of the profit test to economic actions.

Filtration Data

A manual for designers needing a single source of data on filtration has recently been published under the title "Filtration Manual" by Purolator Products Inc., Rahway, N.J., U.S.A. Priced at $1.00, its 32 pages contain much useful information.

Petroleum Financing

Available from the Petroleum Department of The Chase Manhattan Bank is the address on petroleum financing which Lyon F. Terry, vice-president of the Bank, gave to the Financial and Accounting Group of the API in November last. He concludes that competition between banks will be keen and that "the petroleum industry will have excellent service in the financing of its future capital requirements".

Guide to Lubricants and Fuels for Road Vehicles

Mobil Oil Company has recently issued a booklet entitled "Lubrication and Fuels for Commercial Vehicles". Its aim is to give information in a simple form on the correct application of fuels and lubricants in order to obtain the best performance from road vehicles.

There is a chapter on the importance of lubrication, and another explaining the principles of lubrication. Further chapters deal with engine lubrication systems, the characteristics of crankcase oils, gear oils, and greases, the lubrication requirements of different types of gearbox and final drive, and the fuel requirements of the internal combustion engine. At the end of the booklet a guide is provided to the common causes of engine failure.

Copies of this publication are obtainable from the Company at Caxton House, Westminster, London, S.W.1., or from any of its Automotive Divisional Offices.

Manual for Tractors and Farm Machinery

A revised edition has been published recently of the Mobil Oil Company's "Lubrication and Maintenance Manual for Tractors and Farm Machinery". This 48-page booklet deals first with the various aspects of engine maintenance and then with power units.

Information is given on the care of stationary engines and there is in addition a fault-finding table, a maintenance schedule, a general lubrication guide, advice on the storage of equipment, and a survey chart for individual use.

Copies of the manual are obtainable through agricultural agents.

"On Stream"

Employees of the Mobil Oil Company in the British Isles are to see a new film—*On Stream*—which deals with the operations of Flying Red Horse Companies throughout the world.

The film's first showing, at the Royal Festival Hall, London, was seen by 2500 members of the staff and their friends. Welcoming the guests, the Chairman of the Mobil Oil Company, J. C. Gridley, said that the film told the story of the workaday lives of some 67,000 Socony Mobil people all over the world. It epitomized the Group's policy which recognized the supreme importance of the individual, first, as a person with his or her own family responsibilities and, second, as a valuable member of the Socony Mobil national and international communities.

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ABCM INSTRUMENTATION APPRECIATION CONFERENCE

The Association of British Chemical Manufacturers is organizing an Instrumentation Appreciation Conference to be held at Harrogate from 19 to 22 April. The Conference is intended primarily for higher management, to acquaint them with the potentials and benefits of more extended instrumentation in the factory. It will not be of a highly technical nature. There will be a display and demonstration of modern measurement and control equipment by the leading instrument makers, designed to illustrate the points made in the various Conference lectures.

Further details, with application forms, can be obtained from the Intelligence Officer, The Association of British Chemical Manufacturers, Cecil Chambers, 86 Strand, London, W.C.2.

The Economic Impact of Oil on the Arab Middle East

By JOHN MURRAY, O.B.E. (*Fellow*)

Part III The Effect of the Companies

The very size of the huge payments made in recent years to many Middle East States and the dramatic changes resulting from their investment or squandering are apt to obscure the fact that the first important impact of oil companies was the direct one of local expenditure and employment. In fact the use of services and manpower had often reached a high level long before the production of oil in quantity transformed concession rentals into substantial revenues. It is this direct impact in its economic, and sometimes also in its social, effect which is the subject of this Part of the series.

The Size of the Impact

It is not easy to assess the size of this impact, leaving the contributions to state coffers out of account: one yard-stick, however, is that of local expenditure; and on this basis the effect overall is always substantial and sometimes great. Even in the small island of Bahrain, for example, the total local expenditure of Bapco has been estimated at the equivalent of $5 million yearly[1]; and the expenditure in Iraq of I.P.C. and its Associated Companies was some £8·7 million in 1952, £8 million in 1953, £7·5 million in 1954 and about £8·8 million in 1955. Indeed, the total expenditure of these Companies in that country since the war is probably not less than £60 million. Equally large figures could be quoted for most of the oil companies in the Middle East: thus Longrigg[2] gives $20 million as the local expenditure of Aramco in Saudi Arabia and $15 million for that of the Kuwait Oil Company as early as 1949. The effect of spending on this scale in the small countries mostly concerned is certainly considerable.

Another yard-stick is that of employment; and by this measure also the impact of oil is large. A United Nations source[3] estimated that in 1954 the petroleum industry of the Middle East employed approximately 150,000 persons (double the estimate for 1945); the bulk of these are local labourers and artisans of whom the industry is certainly the largest single employer in the region, Egypt excluded. Little imagination and no country-wide statistics (which in any case are non-existent) are required to deduce that Aramco, with a labour force in 1953 of nearly 15,000 Saudi Arabs[4] apart from other nationalities, was a larger employer than all other Saudi industry (such as it is) put together, or to consider that Bapco, with 5829 Bahrainis employed at the end of 1954[5], is likely to be the largest private employer in the island. In some cases, indeed, oil is virtually the only industry. Even in the more developed country of Iraq, the personnel figures of I.P.C. and Associates, varying as they do between 11,000 and 13,000 over the last five years, represent a significant part of the total industrial employment of some 90,000[6]. And of this total, a high proportion is in the small "under twenty man" establishments, the only commensurate employers in the country being the State Railway and the Basrah Port Authority. Only in Egypt, Syria, and the Lebanon is petroleum employment swamped by that in other industries.

Though this direct impact began early and has been substantial for many years, the attitudes of the companies towards it—and indeed the opportunities for its increase—have undergone a process of development both economic and social. As late as April 1952 an American writer could say, "Generally speaking . . . Middle Eastern oil can hardly be regarded as an integral part of the regional economic life".[7] Such a statement was probably too sweeping by that date even if the State revenues producing results in economic development be regarded as something separate from the industry from which they spring; but it is certainly true that the frequent physical separation of fields and refineries from the main centres of population and industry, the absence of Government and private facilities, and the under-developed nature of the region have meant that the oil industry in its early phases has often operated *with* rather than *in* the general economy of the countries. Self-sufficiency was in fact the only road which many companies could tread. Agreements often provided the constitutional framework which made this form of co-existence possible, so that a United Nations economist could write in March 1951[8], "the terms of their concessions give the foreign companies a freedom of action which substantially insulates them from the economies of the Middle East countries. . . . The

Photo by Iraq Petroleum Co Ltd

Wrought iron gate made by a local craftsman in Basrah

impact of oil operations on Middle East producing countries is [therefore] mainly indirect". Today this is not the case, and it is now one of the main objects of the oil companies to integrate themselves into the local economy. It is their desire to operate as naturally as possible as purchasers of goods and services, to be at once less insulated and less dominant, to encourage the development of industries from which they may buy and commerce through which they may trade.

This process is not only an economic one, for if an oil company influences a country economically through its local expenditure it likewise affects the people socially through its employment, or indeed more widely through the example which it presents. "It is, of course, well known that oil companies operating on a large scale in areas undeveloped technologically, have a significance beyond the purpose for which they exist. They represent not only the economic organization of the West, but its industrial society, and are the sources from which the people concerned draw their conclusions about the West."[9] With this in mind, most oil companies have passed from generous and elaborate paternalism into a new phase of social approach in which they continue to give all the benefits of a good employer but are concerned with a multitude of social problems and social contacts which do not face such industries in other parts of the world. It is their object not merely to *give* benefits, but by example or precept, professional contact or normal friendship, to break down the barriers of their foreignness and move with the general trend of social development in the countries in which they work.

The Immediate Economic Impact

The Use of Industry

First in importance and promise for the future—though perhaps not yet in the comparative financial scale—is local purchase, a broad term which actually covers three definable elements of which the most significant, though not the largest, is the use of the products of local industry. Most if not all oil companies in the Middle East purchase from local resources such items as the nascent industries now manufacture; and some spend time and money in encouraging these and in training the artisans who will produce for the company as a customer items which it once made in its own workshops. The most elaborate organization of this nature is perhaps the Arab Industrial Development Department of Aramco, founded in 1945, which gives technical advice, assistance in planning, and aid in the acquisition of materials and equipment to enterprising local men who wish to start businesses of their own. In the words of an Aramco document, "The Company would prefer to have more non-oil industrial activities taken over by others, as such activities are handled in other countries."[10] On a smaller scale, but at least equally effective since some local skills already existed, has been the technical assistance given by several companies to furniture manufacturers, carpenters, metalworkers, and the like; one company, for example, has trained in its own oxygen plant the personnel who will shortly produce in the near-by city the supplies which will permit that plant's relegation to disuse.

Some existing industries have not required encouragement of the spoon-feeding sort but have welcomed the additional stimulus of a company market; such are the cement industry in Iraq, or the brick and tile makers of the same country who export their products to the Gulf; such also is likely to be the new State sand-lime brickworks in Kuwait to which orders are now being given. Some companies are utilizing small engineering workshops which can produce steel shapes and trusses; and where a large city is adjacent to the operation it has often been found possible to encourage the traditional artisans of the suq to produce small castings, wrought iron, or air-conditioning ducting. Ice, acetylene, mineral waters, low-grade soaps, plaster and thatchboard, bags and gunny sacks, workers' overalls, cotton waste, steel windows and furniture, desert coolers and wire nails—all these local manufactures are being bought by companies in places much further east than the reasonably developed industrial centres of the Lebanon or Egypt. Nor is the trade necessarily one way, for oil companies sometimes have items for sale—scrap, unneeded machinery, and the like—which are welcome on the local market, or can pass over, first on contract and later on sale, some small ancillary industry which they are quite willing to shed and which can then serve the community as well as themselves.

It would, of course, be altogether too roseate to depict every oilfield in the Middle East as surrounded by a thriving industrial area, a sort of prosperous Arab Birmingham, in which the roar of furnaces mingles with the soft purr of the artisans' Cadillacs; matters have not developed to this stage yet. Despite company example and assistance, technical education is not widespread and there is a shortage of trained men and skilled artisans; moreover, finance is sometimes lacking owing to the capital formation incapacity mentioned in Part I of this series. For these and other reasons the Middle East is not likely to become an industrial area properly so-called; but some degree of industrialization will be an essential part of economic development in the over-populated countries and desirable elsewhere, and to this the natural stimulation of demand given by the petroleum operators can make a real contribution.

Buying in the Bazaar

Not all the requirements of oil companies can, of course, be found among local manufactures; indeed only a small proportion of their needs can be so met today or even in the foreseeable future: a very powerful imagination is required to visualize a Paxman engine or pipeline truck inscribed "Made in Iraq", much less "Made in Saudi Arabia" or "Made in Qatar". Most of the items needed are of Western manufacture; most are likely to remain so and therefore must always be imported. The scale of these imports is suggested by United Nations figures for the imports of all petroleum companies into Iraq,[11] which were valued in 1952 at ID 14·4 million and ID 13·2 million in the following year.

In the past such imports have tended to be direct, *i.e.* by the companies themselves, partly since they thus retained the benefit of the Customs exemption generally extended in Agreements at least to operational goods, partly because they could then control purchase and progress manufacture in the country of origin. Other reasons—besides the obvious one that in some operating areas there were no local markets at all through which to buy—have also made direct import inevitable or desirable: thus special modifications may be required to vehicles or machinery which can best be achieved by direct contact with the manufacturer; and shipping and insurance of many types of goods are efficiently handled by company head offices as one, possibly recurrent, operation. These are not advantages to be lightly thrown away, even when a local merchant exists from which to buy; but today oil companies, while endeavouring to retain them, are turning to the bazaar for a substantial proportion of imported items.

Such purchases may be either "off the peg" from the goods which a merchant already holds, or through him as an agent for a Western manufacturer. The former has the advantage that company stockholding goes down, and carries a further benefit to the community—and indeed to the foreign exporter—in that the agent is induced to hold a proper stock, particularly of spares: the latter is suitable for the import of the larger and more complicated items. In accordance with this policy purchase from local merchants is being stepped up everywhere in the Middle East. Bapco, for example, has a town office in Manama, the object of which is to utilize available goods and services to the maximum extent; and local purchase is carried out to an ever-increasing degree in such cities as Baghdad, Basrah, or Kuwait, where electrical requirements, car spares, paint, timber, metal sheeting,

This Mosque in the oil town of Ahmadi is under construction by a local contractor

stationery, glass, air conditioners, and the like are being bought to a value which already runs annually to many hundreds of thousands of pounds. Nor are prices always uncompetitive with direct import, while delivery is generally quicker. The companies demand a high standard of quality; this is in fact an advantage to the local market as its standards are thereby improved. So also is the insistence on a reasonable profit margin which teaches a better commercial morality.

A parallel development has been the growth of shops in company areas run by local business men, or the establishment in the immediate vicinity of towns which gain much of their prosperity from the purchases of company personnel. Of the latter type are the "boom towns" of Dammam and al Khobar in Saudi Arabia which in ten years have grown from a collection of huts to centres for Arab merchants and contractors, directly or indirectly serving the needs of Aramco or the prosperity which it has generated. Many companies now encourage private shops on their housing estates, and in one such the main official grocery store, which is necessary as a staff amenity, has next-door to it a rival grocer whose premises have been supplied by the company and who is doing an adequate competitive trade.

The life of a local purchase officer is not, of course, all beer and skittles (both local purchases, no doubt, in some part of the Middle East). Such commercial transactions by oil company officials are not a mere matter of walking into a shop, telephoning an agent, or submitting a list of requirements to a warehouse. The Middle East merchant often considers that when he has made a sale, his obligations to the purchaser are over, forgetting the need for after-sales service and an adequate stocking of spares. But such difficulties can be overcome and are being met.

Loaves and Fishes

A third form of local purchase is the acquisition of food supplies, a large operation of which the varying pattern has been conditioned by locality, transport, and methods of preservation.[11] In some stages of development, oil companies lived, in part at least, off the immediate countryside where indigenous supplies existed; modern deep-freeze and air freight systems have today permitted the search for food for their growing communities over a wider field. By a reverse process these developments have made foodstuffs available on local markets in areas where few indigenous supplies are found and where companies previously had to import everything themselves.

Present methods of food supply therefore vary; some companies purchase from the local market, directly or through agents, as much fresh food—vegetables, eggs, meat, fish, or beer—as that can produce, supplementing these in the Gulf area with fruit and vegetables imported from the Lebanon by local or Lebanese contractors, and conveyed in company or charter aircraft or under the merchants' own arrangements. Items of overseas origin such as canned goods, cheese, ham, and the like may be handled by importing agents on a contract basis. Such foodstuffs are either used in messes and canteens or sold in company stores which are often also run by contractors.

This pattern, though frequent, has many variations. In some areas local grocery shops are now so well-stocked and reasonably priced that the companies do not think it necessary to organize their own food supply except for messes and canteens: in others, while using contractors and the local market for fresh items the company prefers to handle overseas products by its own direct import. Sometimes, as in Qatar, there is so little local supply or market that the company is forced to do most of its own importing of all items; this is also largely the case with Aramco whose installations are situated in a desert so barren that the Company has little chance to purchase local food supplies. Indeed this Company has a major subsidiary, the Aramco Overseas Company, which is concerned with the acquisition of food and supplies "anywhere in the free world outside the Western Hemisphere and Saudi Arabia".[12] This organization is not confined solely to the acquisition of foodstuffs; it is also concerned with diverting other Aramco purchases to non-dollar sources since by a curious economic paradox this wholly American company is short of dollars.*

Such purchases of foodstuffs, whether directly from the local market or through it or even from the Lebanon, are a contribution to the economy of the region. They are substantial but not indiscriminate. One danger sign is well heeded by company purchasers who recognize that in a city such as Kuwait, which has very little local supply of food, care must be taken not to cause a shortage on the market by over-enthusiastic purchase.

* Much of Aramco oil is sold in non-dollar areas, principally Europe, and therefore much of the Company's revenue is not in dollars. It has, however, certain irreducible dollar costs, *e.g.* a large part of the payment of the taxes and royalties to the Government and purchase of Saudi riyals.

Construction by Contract

Larger in its financial impact than present local purchase, however, is the employment by oil companies of indigenous contractors for the construction—and often maintenance—of their housing schemes and many of their installations. Today, in most companies, virtually all civil engineering

Photo by Iraq Petroleum Co Ltd

A train on the I.P.C. railway disgorges its daily load of workers at Kirkuk

work is done by contract, including house construction, painting, plumbing, and carpentry, the construction of industrial buildings and similar installations, fencing, pipe-laying and trenching, tank erection, and road making. For many of these items purely local contractors are employed; for major oil installations, the work may be given to a Lebanese contractor employing mostly local labour and perhaps a few European staff; only highly specialized work such as refinery engineering or generator installation is allocated to Western companies which even then employ many Arab workers.

Such employment of contractors is now a long-established and widely-practised policy in the Middle East petroleum industry: Bapco, for example, farms out many services, particularly construction work, to a local group; Aramco even in the first three years of operation of its Arab Industrial Development Department (which deals with contracts as well as industry) had created by its demand some 70 contractors employing a labour force of three to four thousand, their work including the stringing and welding of the Abqaiq-Ras Tanura pipeline;[13] I.P.C. uses local contractors largely, and all the houses of its extensive Arrapha Estate and Home Ownership scheme have been built by them. Particularly important in the past few years have been the contracts given by the Basrah Petroleum Company and the Kuwait Oil Company, since the former has only recently completed its expansion phase and gone into full production, while the latter is engaged in a vast housing programme and has, in any case, expanded from almost nothing to a huge enterprise in the short space of ten years. The former Company's contracts, which generally include the provision of building materials (for which Basrah is a good centre), must be an important factor in the city's economy: the latter spent nearly a million pounds in Kuwait during 1955 on contracts covering all types of construction work excepting major oil installations. Thus all the Company's housing programmes, the building of schools and mosques, the construction of workshops, swimming pools, and the like are today being carried out by Kuwaiti contractors. Very few, if any, of these have Western partners, though their labour is not all Kuwaiti as the demand for skilled men in this small booming State is more than the local resources can meet.

Another very important field for the use of local contractors lies in the provision of maintenance services. Thus building maintenance, the upkeep of roads, the painting of installations and buildings, and much electrical work are often successfully carried out by these men, sometimes using company equipment. Some companies, too, find that local talent will cope with the welding of pipelines or the installation even of operational machinery.

Such a position has not been achieved without effort, for expert contractors were not found sitting on the desert sand in most areas of the industry's operations. At the outset labour was found to be untrained, equipment scanty and maltreated, and the boss himself so inexperienced that he would run into tendering difficulties, rashly underestimating the cost of the work (with consequent disaster). Less frequently, inexperienced or greedy contractors might grossly over-estimate the cost or put in fantastic financial claims in the hope that they would be accepted or that the company would bargain down and up in traditional fashion. In order to build up a body of reliable firms—a service not only to themselves but to the community, for civil engineering standards in remote areas have thereby been sharply raised—all companies have therefore been obliged to exercise more supervision than would be normal in the West, and some were forced in the early stages to a degree of tutelage which in the case of Aramco in 1948 was described as follows:[13] "The help given to these contractors includes assistance in the procurement of materials such as vehicles and welding sets, with the object of making them as independent as possible. They are even given assistance in preparing tenders, and on more than one occasion when tenders have been received at rates which the company knew to be unremunerative, contracts have been given at higher rates". To the foregoing it may be added that the companies often find themselves concerned to make sure that labour is treated as they would do themselves—not an easy task in view of the high company standards and the tendency of some States to make foreign concessionaires directly responsible for claims by contractors' personnel against their immediate employers.

Today it is common to all oil companies in the Middle East to find local contractors satisfactory: their standards are now generally good; their men are often paid by results and consequently turn out more work than regular company labour, though usually managing to earn as much or in some areas even more; their vehicles are heavily utilized; and their jobs are finished rapidly with a labour force more mobile than the company can deploy.

The Means of Transport

Last, and probably in most cases also least, among the elements of the direct economic impact is the utilization of local transport. Like good telecommunications, an efficient transport service is vital to the success of the oil operation, whether it consists of exploration in remote areas or the development of a field into production and export. Consequently from their earliest days all companies have operated their own vehicles and sometimes air fleets, and have often constructed for themselves road networks, cargo ports as

well as terminals, and private airfields. Such self-sufficiency did not duplicate private or State transport services at the outset, for in many cases these scarcely existed or could not be provided so far off the beaten track. Nor is it abnormal for a large company to have its own vehicle fleet in any country. Today, however, the Middle East States are developing their transport facilities and the growing general prosperity has led to an extension of private transport companies. Consequently the oil industry is now able to turn to local resources for some of its needs.

One example of this is the use of hired vehicles for personnel transport. Most companies run bus services either within their own areas or to and from the nearest city; and many of these are now operated by contractors. Such is the employment in Basrah of substantial numbers of local buses to provide a service for the Company's labour, these at one time having been hired from the Municipality. Scheduled personnel movement for operational purposes may also be handled by contracted vehicles; one company, for example, hires taxis to take shift crews to gathering centres and pump houses. The development of taxi services has indeed been stimulated by the oil operation in more than one region; a marked effect of the operations of Aramco has been the establishment of taxi companies, not only in Dhahran but in many other parts of Saudi Arabia; and at Ahmadi a fleet of privately-owned taxis runs within the Company areas or to Kuwait at very reasonable rates.

Contracting for the hire of trucks is not extensive, particularly since vehicles of special types are not readily acquired by local owners, nor would they have much use outside oil company activities nor necessarily continuity within them. Even ordinary trucking is not easily made profitable to the contractor and at the same time economical to the company, for the oil operation brings sudden peak demands which may entail the maintenance of a fleet of vehicles at other times not fully utilized. Where such trucking is on a regular scheduled basis, however, oil companies have begun to put it out on contract; and privately-owned tankers may now carry water regularly to desert locations or haul rations down a pipeline on a fixed time-table.

Most companies service their own vehicles; but local standards are rising and work on the private cars of oil staff is now in some areas carried out by independent garages. Sometimes companies encourage the development of these, even within their own housing estates. In more than one city a transport department puts out part of its work to local garages; this has been found particularly satisfactory in regard to repairs of scrapes and scratches, crushed bodies, or dented wings—on which the Middle East mechanic probably gets plenty of practice. Such encouragement is in fact a service to the community; so, indirectly, is the existence of the network of roads in desert regions, constructed by oil companies for their own use but forming also a major contribution to communications facilities, an economic bottle-neck in most Middle East countries.

Where railways exist in suitable locations, oil companies are their customers—and sometimes their creators, as in Saudi Arabia where Aramco has built the one railway for the Government and is now a regular user. But the limited railway facilities are in only a few countries so aligned as to meet the oil industry's needs; where they are an important natural economic relationship exists, as in Iraq where I.P.C. and its Associated Companies are almost certainly the best private freight customer to the Iraq State Railways. Here geographical conditions have made the railway a "natural" for utilization, for its lines link the one port through which all heavy stores must come with such operating areas as Kirkuk, Baiji, and the Mosul region. In this country, too, there is the interesting phenomenon of a private Company railway line extending from Kirkuk station to the principal installations of the Fields headquarters; this is operated by Iraq State Railway personnel to the requirements of the

Photo by Iraq Petroleum Co Ltd

Oil company pipe leaves the port of Basrah on Iraq State Railway flat-cars

Company. The existence of this line not only enables material to be brought right into the Stores yards without transhipment at the main station, but also allows the Company to run trains for the daily conveyance of its workers.

The ports of the Middle East originally grew up without reference to oil, their location being determined by such factors as the existence of natural harbours and of trade routes to the hinterland; not all, therefore, can be used by oil companies for their imports. Thus the Kuwait Oil Company has cargo facilities on its great jetty at Mina al Ahmadi, and Aramco has not only constructed facilities for itself but has been responsible for the establishment of the port of Dammam which is of general service to the Saudi Arabian economy. As with railways, geographical conditions have perhaps produced in Iraq the most natural example of the utilization of a local port: Basrah is the one port of the country and through it passes the major part of the stores and material required for both Governmental and private oil operation. The tonnage so imported generally runs into six figures and may easily be as much as one-seventh of the annual import trade through Basrah port—which in turn is still the main industry of the city. Nor are the oil terminals, their main function apart, without direct effect on the economy of the countries: agency work may be done locally or local pilots bring the tankers alongside the oil jetty, and companies may co-operate with or assist the authorities in regard to lights and marks. Port dues paid by oil companies may have an important influence; the Director of the Port of Basrah, for example, estimated that the loss to that Authority by the closing of Abadan and the cessation of the dues paid by A.I.O.C. for the 2000 tankers which passed each year up the Shatt-al-Arab, was of the order of one million dinars per annum, a sum which covered the cost of the continuous dredging of the channel and bar.

The modern oil operation as conducted in desert regions also demands a fourth form of transport, for aircraft have been found by far the most efficient method of conveying supplies and personnel to and from remote locations. Most companies therefore maintain their own fleets, sometimes private, sometimes chartered; and not all the latter hiring comes from Western sources: regular charters are made, for example, from airlines in the Lebanon for the transport of freight and vegetables to the companies operating on the Persian Gulf. This too, is a contribution to the local economy and an aid to its development.

(Part III to be continued.)

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U.K.'s LARGEST REFINERY COLUMN

The largest refinery column ever built in the U.K. set out during February on its 4000-mile journey from the Greenwich works of G. A. Harvey and Co (London) Ltd to the Cardon refinery of Compania Shell de Venezuela where it will form part of a catalytic cracking unit.

The column was 141 feet long, 19 feet 2 inches in diameter, and weighed 147 tons. It was first floated and towed down the Thames to the King George V Dock and then loaded on to the deck of the motor vessel *Loch Ryan*. While on board the *Loch Ryan*, the column was flame-cut into two sections to facilitate handling and erection at Cardon.

An identical fractionating column for the Shell refinery at Curaçao, Netherlands Antilles, will be handled in a similar way in June.

A Shell photo

The column being towed down the Thames

Trade Literature

Sensitive Fire Alarm

Among the products of The Pyrene Company to be displayed at The Factory Equipment Exhibition this month is an especially sensitive fire detecting system.

New Polyolefin Plastics

Pullman Incorporated, of which The M. W. Kellogg Company is a subsidiary, has signed an agreement with Phillips Petroleum Company to produce new types of polyolefin plastics.

The M. W. Kellogg Company produces fluorocarbon resin products under the trade-mark "KEL-F" but the Phillips process, which employs a new type of catalyst, will not only produce a new type of polyethylene but will also form a basis for developing a whole new spectrum of resins from olefins available from the petroleum industry.

The new polyethylene has higher tensile strength, greater rigidity, and higher impact strength than that prepared by the present commercial method. It is hoped that it will invade the markets of other plastics such as the styrenes, acetates, and vinyls.

Lubricating Oil Plant for Durban

W. J. Fraser & Co Ltd, chemical engineering contractors, have been awarded a contract to engineer and construct a complete, large-scale lubricating oil blending and packing plant at Durban, for the Shell Company of South Africa.

Fraser's South African associates, Fraser & Chalmers (S.A.) (Pty) Ltd will play an important part in the project.

Weld Inspection

Weld inspection methods used by Whessoe Ltd of Darlington are summarized in a leaflet, Whessoe Publication 62, issued recently by the Company. Copies are obtainable from the Company's Darlington works or from 25 Victoria Street, London, S.W.1.

Spencer & Partners

Spencer & Partners, independent consultant engineers specializing in general corrosion prevention and particularly the design of cathodic protection installations, has been formed by K. A. Spencer, B.Sc.Tech., M.I.Chem.E., F.I.M., taking into partnership P. W. Heselgrave, B.Sc., D.I.C. W. H. J. Vernon, O.B.E., D.Sc., Ph.D., F.I.M., F.R.I.C., is associated with the practice as co-consultant and adviser.

Small Dry-Chemical Fire Extinguisher

The Pyrene Co Ltd is now marketing a new pressure-operated dry-chemical fire extinguisher which weighs less than 10 lb when fully charged. The new extinguisher has been designed to meet the need for a small but powerful means of dealing with outbreaks involving petrol, oils, paints, spirits, solvents, greases, etc. It can also be safely used on fires involving electrical equipment.

Phillips Petroleum Company Special Products

In order to free their instrument and equipment shops for development work on instruments to be used in the Company's own operations, the Phillips Petroleum Company has recently concluded an arrangement whereby the manufacture, sale, and servicing of certain special products will be taken over by the Waukesha Motor Company, Waukesha, Wisconsin.

Organic Research Chemicals

A 1956 catalogue of organic research chemicals is now available from L. Light & Co Ltd, Poyle Estate, Colnbrook, Bucks.

CRUDE OIL PRODUCTION

	1955	
	Dec.	*Jan. to Dec.*
	Tons	
Iraq Petroleum Co Ltd . .	2,196,090	24,202,271
Basrah Petroleum Co Ltd .	679,079	7,231,528
Mosul Petroleum Co Ltd . .	103,097	1,282,428
Qatar Petroleum Co Ltd . .	456,320	5,361,779

	1956
	Jan.
	Brl.
Kern Oil Co Ltd:	
California	109,814
Trinidad	87,500
Trinidad Petroleum Co Ltd .	340,882
	Tons
Kuwait Oil Company . .	4,711,895

SCALING-UP OF CHEMICAL PLANT AND PROCESSES

The Institution of Chemical Engineers and The Chemical Engineering Group of the Society of Chemical Industry are to hold a joint two-day symposium on the scaling-up of chemical plant and processes in London in June 1957. The symposium is to be held at the invitation of the Chemical Engineering Group, Het Koninklijk Instituut Van Ingenieurs and the Section for Chemical Technology, De Koninklijke Nederlandske Chemische Verenigning.

UNIT OPERATIONS OF CHEMICAL ENGINEERING

A vacation course on unit operations of chemical engineering is to be held at Loughborough College of Technology from 16 to 28 July inclusive. The course will take the form of lectures and related practical work on unit operations such as heat transfer, fluid flow, distillation, evaporation, absorption, filtration, drying, humidification, and mixing.

The course has two main purposes—"to provide the plant or industrial chemist with an intensive introduction to chemical engineering theory and practice, and to give the chemical engineer-in-training the opportunity to enlarge on and consolidate his existing knowledge in preparation for professional examinations".

Application forms and further details can be obtained from Dr R. F. Phillips, Department of Chemical Engineering, Loughborough College of Technology, Loughborough, Leicestershire.

Notes of the Month

Oil Shale Mining Research

The U.S. Government's oil shale mine at Rifle, Colorado, will become an underground laboratory for mining research on rock movement, ventilation, drilling, blasting, automation of equipment, and for conducting related studies, the Bureau of Mines announced recently in Washington.

It is not proposed that any new completely integrated system of mining will be developed at Rifle but, aided by a $1 million appropriation from Congress, the Bureau will begin driving entrances to the oil shale formation and will renew studies which were halted more than a year ago.

Safety will be one of the leading considerations, since any future commercial operation to develop oil shale for gasoline and other products must consider the welfare of underground employees along with mining costs.

It is planned to develop safer and possibly cheaper methods of mining oil shale.

International Symposium on Combustion

An international symposium on combustion, the first to be arranged by The Combustion Institute, is to be held at Yale University from 19 to 24 August 1956.

The Combustion Institute was incorporated in Delaware, U.S.A., in 1954 as a result of the success of three international symposia on combustion held in 1948, 1952, and 1954. The Institute is international in character and includes on its Committee three British representatives who, together with Dr J. W. Linnett of Oxford University, form the committee of the British Section.

The Institute does not compete with other societies in meetings or publications, its main object being to "bring together in the field of combustion the many scientific and engineering disciplines which are important for its development".

Further information about the Institute and the International Symposium can be obtained from the assistant secretary of the committee of the British Section of the Institute, Miss H. Smith, c/o Joseph Lucas Ltd, Great King Street, Birmingham 19.

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A BP photo

The British Petroleum Company, through D'Arcy Exploration Company (Africa) Ltd, has been granted four concessions in Libya. Three of the concession areas are in Cyrenaica and the fourth in Tripolitania. Survey work is planned to begin this year. Seen during the signing of the agreement are: (left to right) *D. R. de L. Macpherson (representative of D'Arcy Exploration Co (Africa) Ltd), H. E. Salam al Qadi (Minister of National Economics, Libyan Government), Anis al Qassim (Chairman of Petroleum Commission, Libyan Government), and K. R. Henshaw (D'Arcy Exploration Co)*—*—second from right.*

Hungarian Productivity Increase

The Hungarian News and Information Service has recently reported that productivity in Hungary's state industry last year rose by 6·1 per cent. All sections of industry overfulfilled their production plans, the average being 103·2 per cent of plan. More than three-quarters of the increase came from higher productivity, states the Central Bureau of Statistics.

Output figures for some of the main industries include: oil—1,600,000 tons (31·6 per cent up); coal—22,300,000 tons (3·6 per cent increase on 1954); electric power—5,400 million Kilowatt hours (12·8 per cent up); chemicals—organic chemicals 19·1 per cent, inorganic chemicals 7 per cent, and mineral oil processing 6·6 per cent.

Mafia Test Well

Drilling has been concluded at 11,051 feet at the test well on Mafia Island, off the coast of Tanganyika, where the D'Arcy Shell Petroleum Development Company has been at work. Valuable geological information has been obtained. A second test well is to be drilled at Zanzibar.

India's Deepest Well

A new record in deep drilling operations in India has been set with the drilling to a depth of 11,855 feet of Well No 12 at Naoholia in the Hugrijan oil prospecting area of Upper Assam.

If the well, which is being drilled by the Assam Oil Company, goes beyond 12,666 feet it will be the deepest well ever drilled in Asia.

British Part in French Oil Search

British capital is to be used directly for the first time in the search for oil in France. Oil exploration licences in the Isere Department of France, on the western edge of the Alps, have been granted to a new Company, Société des Pétroles de Valence, in which BP has a 30 per cent holding through the D'Arcy Exploration Company.

A further 20 per cent of the new company's capital is held by BP's French associate, Société Française des Pétroles BP.

BP Road Tests in Sweden

A team of British Petroleum Company technicians and drivers who went to northern Sweden to carry out road tests under cold weather conditions had to conclude their visit in a temperature of 76 degrees of frost—extremely cold weather even by Swedish standards.

Fortunately, the team obtained all the required results in their examination of the performance of motor fuels and

A BP photo

A Laplander and his reindeer encountered near Sveg by members of the BP team in Sweden

oils under cold weather conditions. The results are complementary to the study undertaken by a BP team last July in Algeria where high-temperature performance was examined.

Twelve cars took part in the Swedish tests, five of them coming from BP's research station at Sunbury with 85 jerricans containing nine special reference fuels.

A series of tests were carried out on each car and with each of the reference fuels to find out the time taken for the engine to warm-up in relation to the increase of speed during a given time. At the same time notes were made on the time taken to start the cars after they had been left in the open during the night.

In addition, a temperature survey was undertaken, as in Algeria last summer, to discover the relationship between air temperature and engine and fuel system temperatures at various speeds.

The opportunity was taken to compare BP Energol Visco-Static Motor Oil with a normal SAE 20W motor oil and results showed easier starting on Visco-Static at temperatures down to 22° F.

1956 Dechema Congress

The theme of the Dechema Congress for 1956, which is to be held in Frankfurt am Main from 6 to 9 June, will be "The Basic Principles of Chemical Engineering as Applied to Chemical Reactions on a Large Scale". There will be about six plenary lectures and a series of brief discussion lectures on the latest developments in research and practice.

The 9th Meeting of the European Federation for Chemical Engineering will be held in connexion with the Annual Congress.

Programmes and application forms can be obtained from Dechema, Frankfurt am Main, 7, Postfach.

Oil in North Kuwait

Tests are now being carried out to assess the extent and commercial value of an oil accumulation which has been discovered sixty miles north of the present operations area in Kuwait. In the course of drilling test well Raudhatain No 1 oil sands were penetrated which are similar in many respects to the oil-producing series in the Burgan Field.

Raudhatain No 1 was completed below the base of the sands at 10,301 feet and production tests have since proved the existence of a considerable oil accumulation. Another exploratory well, Raudhatain No 2, is now being drilled to help determine the extent of the accumulation.

BP Encouragement for Young Technologists

The British Petroleum Company has devised a scheme whereby it will pay the University education fees and some other expenses of selected young men wishing to become technologists, and at the same time pay a salary of £350 a year.

This is an important step in the effort to combat the growing shortage of trained technologists in the U.K.

The apprentices will rank as Company employees and will work at Company centres during the long vacations to gain practical experience.

Change-over in Iranian Health Services

The National Iranian Oil Company has taken over the operation of medical and health services in the oil areas of South Iran as the first step in the company's assumption of responsibility for certain "non-basic" operations under the 1954 oil agreement.

Health and medical services were previously managed by the two operating companies of the Consortium, Iraanse Aardolie Raffinage Maatschappij N.V. and Iraanse Aardolie Exploratie en Productie Maatschappij N.V.

Under their control came nine hospitals and 39 clinics employing nearly 2000 people. One and a half million examinations are made annually—all employees and their families being able to use the facilities. In places where no other medical services are available non-employees are also treated.

Reduction of Cylinder Wear in Marine Oil Engines

Cylinder wear in large marine oil engines burning heavy fuel oil has been reduced by about 70 per cent with the use of a new type of diesel engine cylinder oil, Shell Alexia Oil A, a stable water-in-oil emulsion containing special additives to prevent corrosive wear.

Field trials with the new lubricant began at the end of 1953

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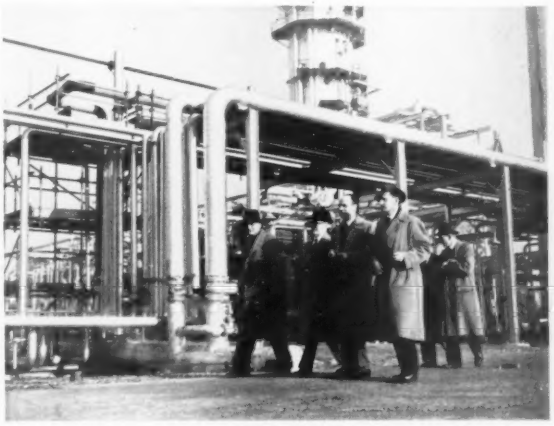

The Minister of Fuel and Power, The Rt. Hon. Aubrey Jones, M.P., recently visited the Esso refinery at Fawley, near Southampton. He is seen here (third from left) *touring the plant with Sir Leonard Sinclair* (*Chairman and Managing Director, Esso Petroleum Company*—second from left) *and Mr George Noble, O.B.E.* (*Director, Esso Petroleum Company*—extreme left). On the right of the front row *is Dr A. W. Pearce, Ph.D.* (*assistant refinery manager*), *and* (behind) *are Mr D. A. C. Dewdney* (*assistant refinery manager*) *and Dr F. Mayo, Ph.D.* (*refinery manager—partly obscured*).

and it is now in use in about 275 ships. On the basis of the wear reductions obtained, cylinder liners with boiler fuel are expected to last about three times as long as with conventional cylinder oils. In addition, the lubricant keeps cylinders and pistons in cleaner condition and in some cases has removed deposits formed by non-additive oils.

High cylinder wear in large marine oil engines has become a major problem as the use of boiler fuel has increased. The conventional H.D. oils do not possess sufficient neutralizing power to combat the highly acidic combustion products of boiler fuel, and extensive test-bench research had to be carried out before this new lubricant was successfully developed.

School News Sheets

In response to many requests from school children for information regarding the oil industry, the Mobil Oil Company is producing news sheets and pamphlets for them.

The latest information sheet deals with lubrication and illustrates how everything that moves, from the works of Big Ben to the Folland "Gnat", must be lubricated.

Copies of these publications can be obtained from the Company's Information Officer, at Caxton House, Westminster, London, S.W.1.

Scottish Firm Wins Contract for Distilling Plant

G. & J. Weir Ltd, Glasgow engineers, have successfully competed for a contract to build a £1¼ million sea-water evaporating and distilling plant which will be one of the largest in the world.

The plant is to be installed at Aruba, Netherlands Antilles, and will provide eight thousand tons (1,792,000 gallons) of fresh water per day.

This export order was the subject of keen international competition among fifteen other firms in Britain, America, Germany, Italy, and France.

G. & J. Weir Ltd recently dispatched two sea-water distilling plants to the Lobitos oilfields in Peru and another to Kuwait.

Soundproofing of Venezuelan Rig

Sixteen thousand sterling has been spent by Cia. Shell de Venezuela in soundproofing equipment for a drilling rig within the city limits of Maracaibo, Venezuela, so that residents will not be disturbed. The equipment, which has been supplied by the MACCO Corporation of California,

General view of Maracaibo rig

A Shell photo

reduces the noise to little more than an industrial hum at a distance of 100 yards.

The material used to carry out the soundproofing consisted of panels of one-inch-thick fibre-glass "batting" sandwiched between layers of fibre-glass cloth impregnated with vinyl plastic to give protection against fire, rot, and mildew. The panels are fastened to the rig and can be dismantled for re-use once the well has been completed.

Equipment auxiliary to the rig has been similarly treated.

Internal ventilation has been installed in the rig and strong guy-lines hold the enclosed derrick firmly against the wind.

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Forthcoming Meetings

THE INSTITUTE

(At 26 Portland Place, London, W.1., 5.30 p.m.—tea 5 p.m.)

The Oil Industry—its Place in the World and its Future. J. W. Platt, M.Inst.Pet. **11 April**

IP FAWLEY BRANCH

(At Esso (Fawley) Recreation Club, Holbury, 7.30 p.m.)

Miscellaneous Oil Products in the Textile Industry. F. N. McLaren **13 April**

IP LONDON BRANCH

(At 26 Portland Place, London, W.1., 6 p.m.—tea 5.30 p.m.)

Distribution of Petroleum in the United Kingdom. H. D. Newlyn. **18 April**

Future of the Petroleum Industry in the United Kingdom. C. P. Dalton. **23 May**

IP SOUTH-EASTERN BRANCH

(At King's Head Hotel, Rochester, 7.45 p.m.)

Oil Tanker Operations. Captain Nesbitt. **1 May**

IP STANLOW BRANCH

(At Grosvenor Hotel, Chester, 7 p.m.)

Thermal Insulation. (Joint meeting with Institution of Chemical Engineers) **18 April**

OTHER SOCIETIES

Opening Conference of a Special Study of "Domestic Heating in the United Kingdom—Present and Future" at Church House, Westminster. Organized by The Institute of Fuel. **1 and 2 May**

Patents in Chemical Engineering. H. L. Downes. The Institution of Chemical Engineers, North Western Branch. Leeds, The University, 7 p.m. **11 April**

SITUATIONS VACANT

GRADUATE MECHANICAL AND CHEMICAL ENGINEERS required for Caltex group of Oil Companies. Applicants must be under 35 years of age with good Degrees and prepared to serve overseas after initial period in London. The duties involve problems connected with design and layout piping systems, sizing of pumps and heat exchangers, etc. and include cost estimation, preparation bills materials and expenditure requests. Salary according to qualifications and experience. Apply in writing with full particulars and quoting 'L' to Caltex Services Ltd., Thames House (Entrance 3), Millbank, London, S.W.1.

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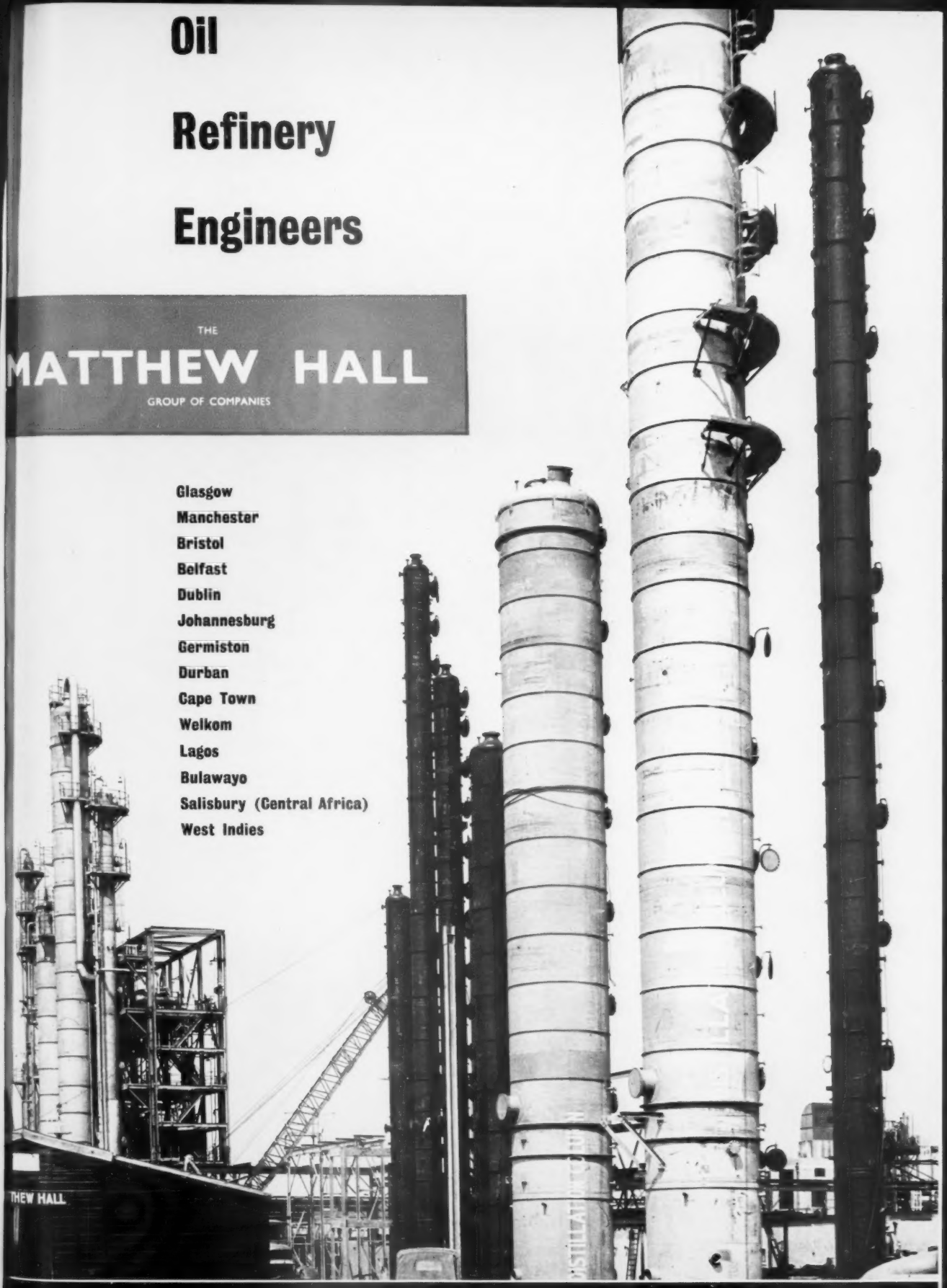

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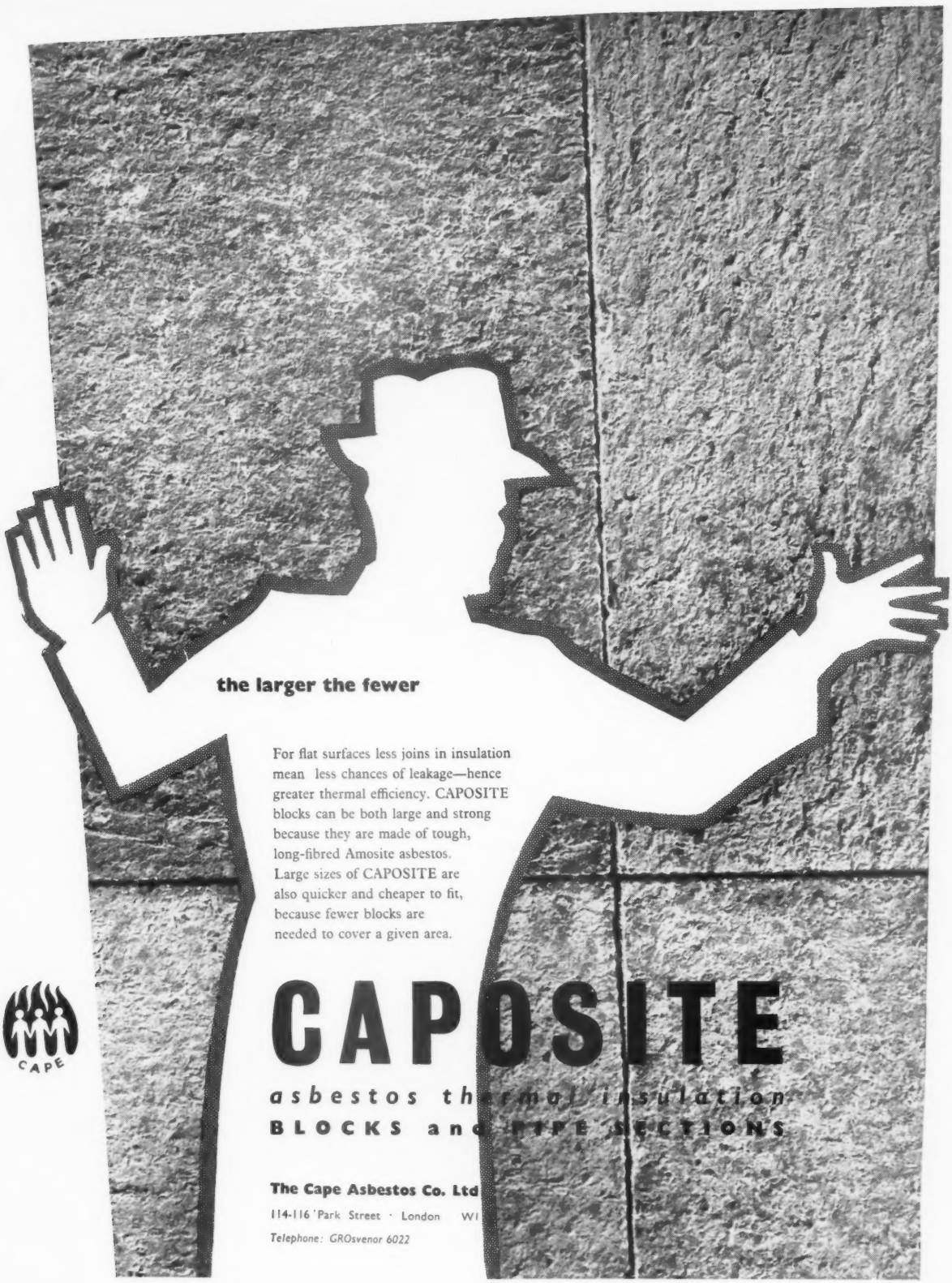
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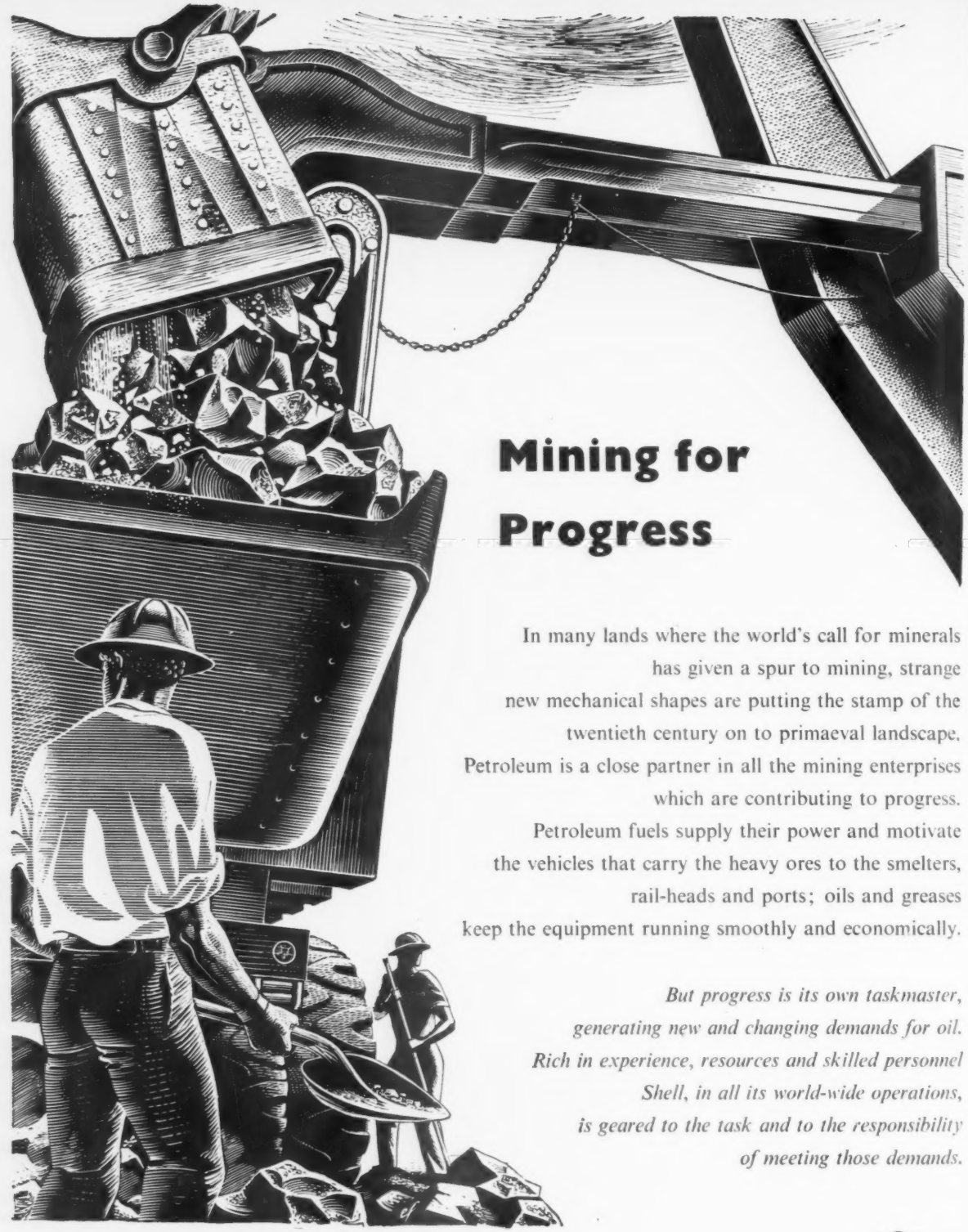

Mining for Progress

In many lands where the world's call for minerals has given a spur to mining, strange new mechanical shapes are putting the stamp of the twentieth century on to primaeval landscape. Petroleum is a close partner in all the mining enterprises which are contributing to progress. Petroleum fuels supply their power and motivate the vehicles that carry the heavy ores to the smelters, rail-heads and ports; oils and greases keep the equipment running smoothly and economically.

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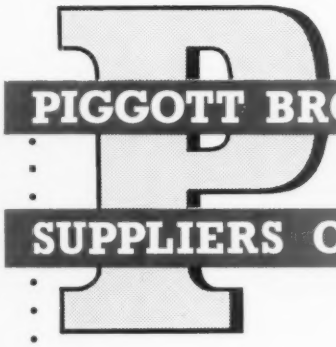

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F.57

BP SOUNDS THE SWAMPS

Soon a buried charge of dynamite will be set off. A geophone is being carried to a nearby position, for the geophysicist to take a reading. Does oil lie here beneath the swamps of Papua? These tests will help to give the answer.

Men of the D'Arcy Exploration Company—prospecting subsidiary of The British Petroleum Company—are at work in many parts of the world surveying and testing. In Papua, in Zanzibar, in Sicily, in Malta, in Western Canada and in many parts of England, The British Petroleum Company is keeping up the search for new supplies of oil : oil to satisfy the ever-growing world demand.

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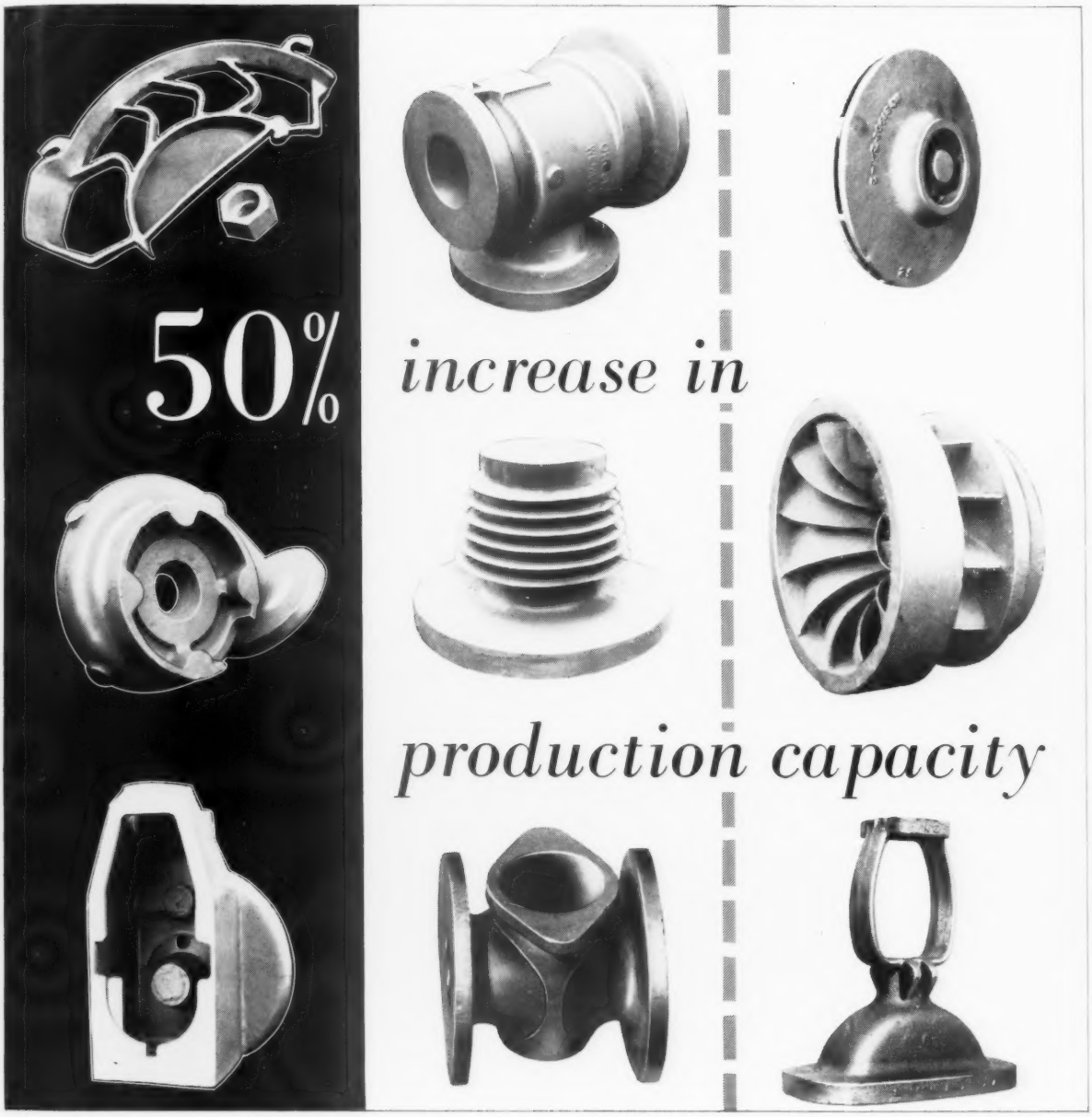

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Kwinana Refinery

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* Covered by British patents.

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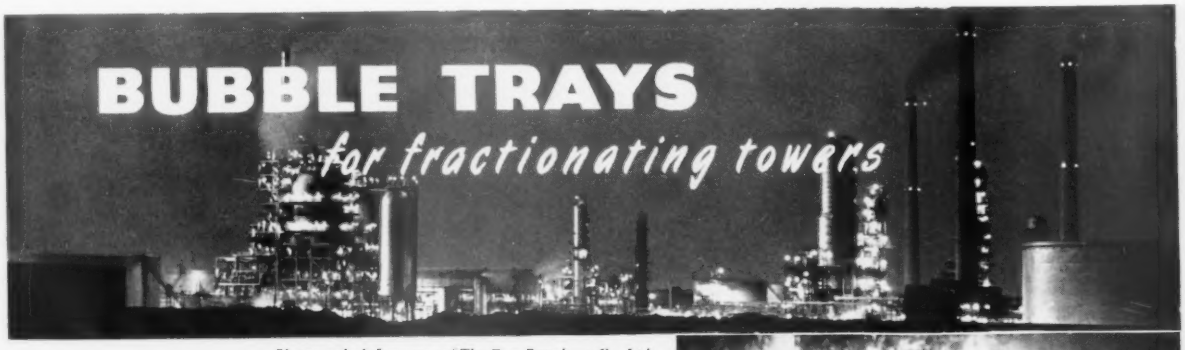

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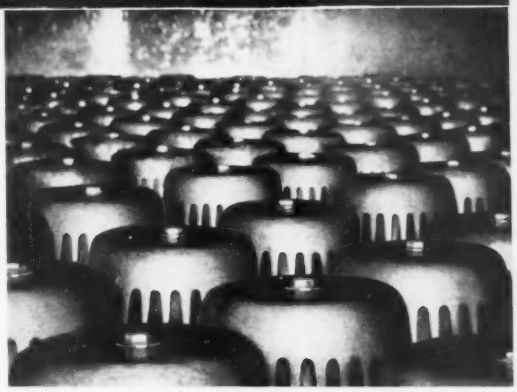

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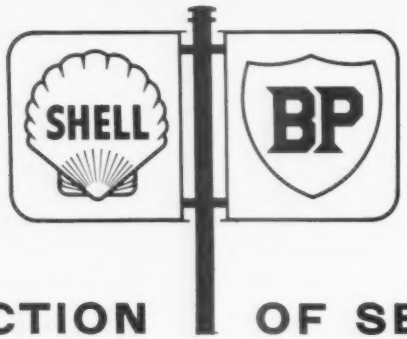

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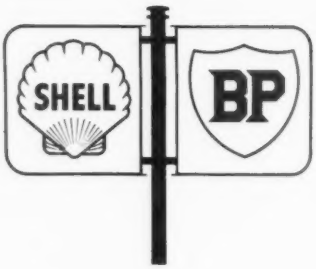

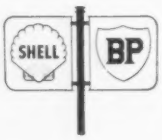

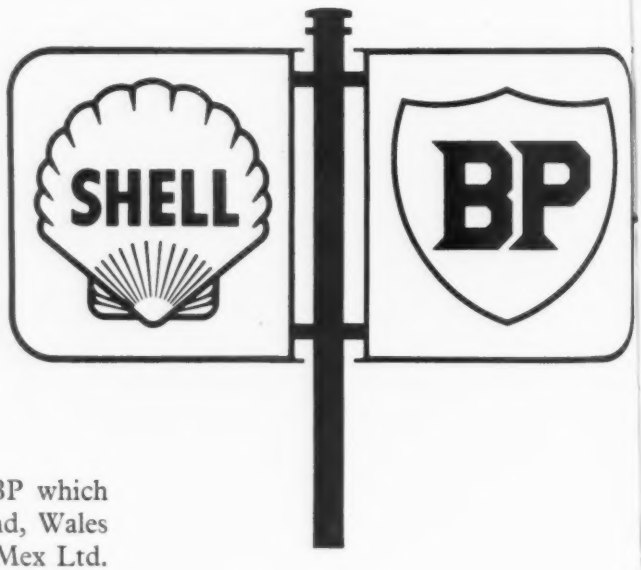

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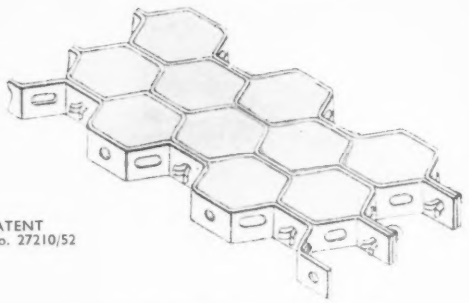

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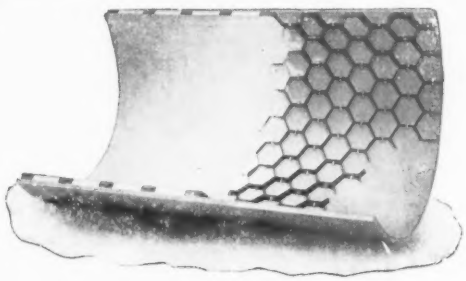

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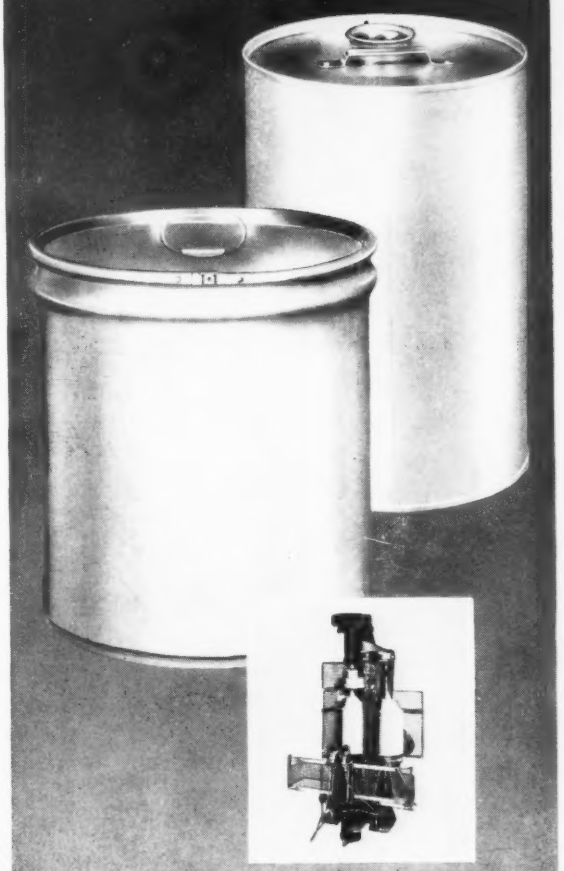

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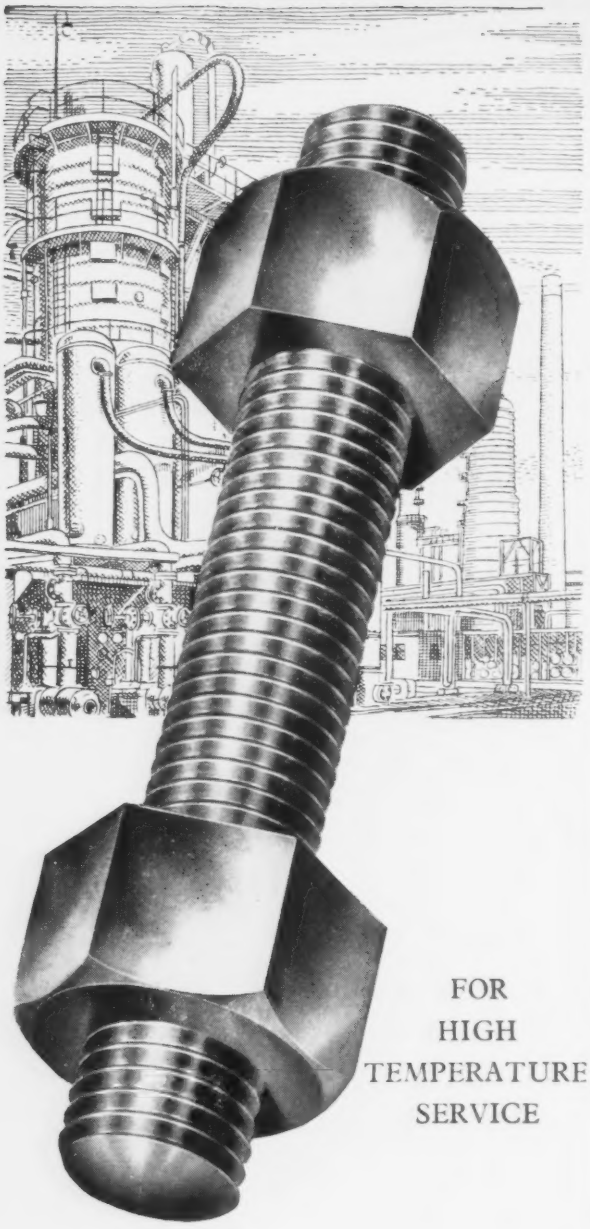

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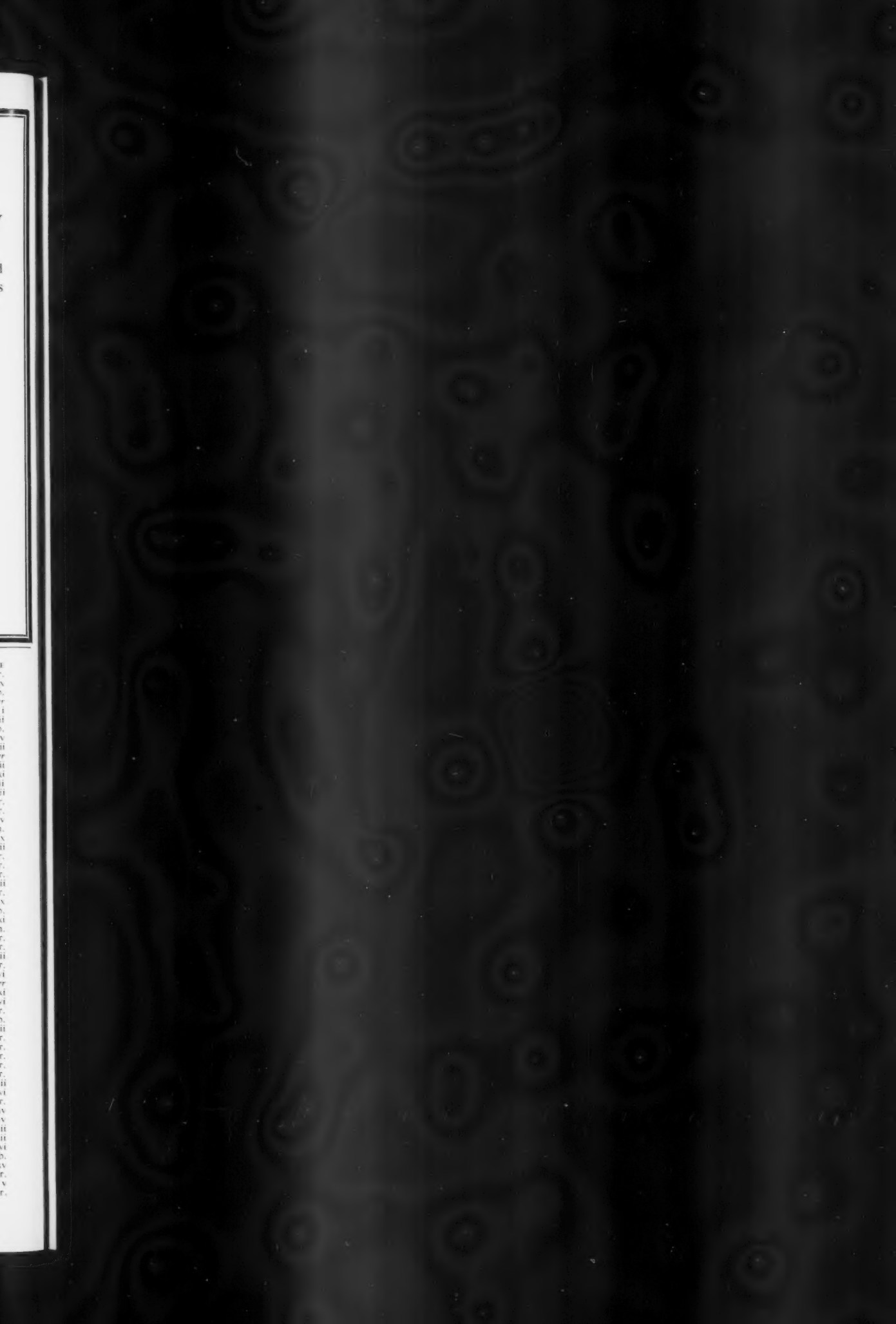

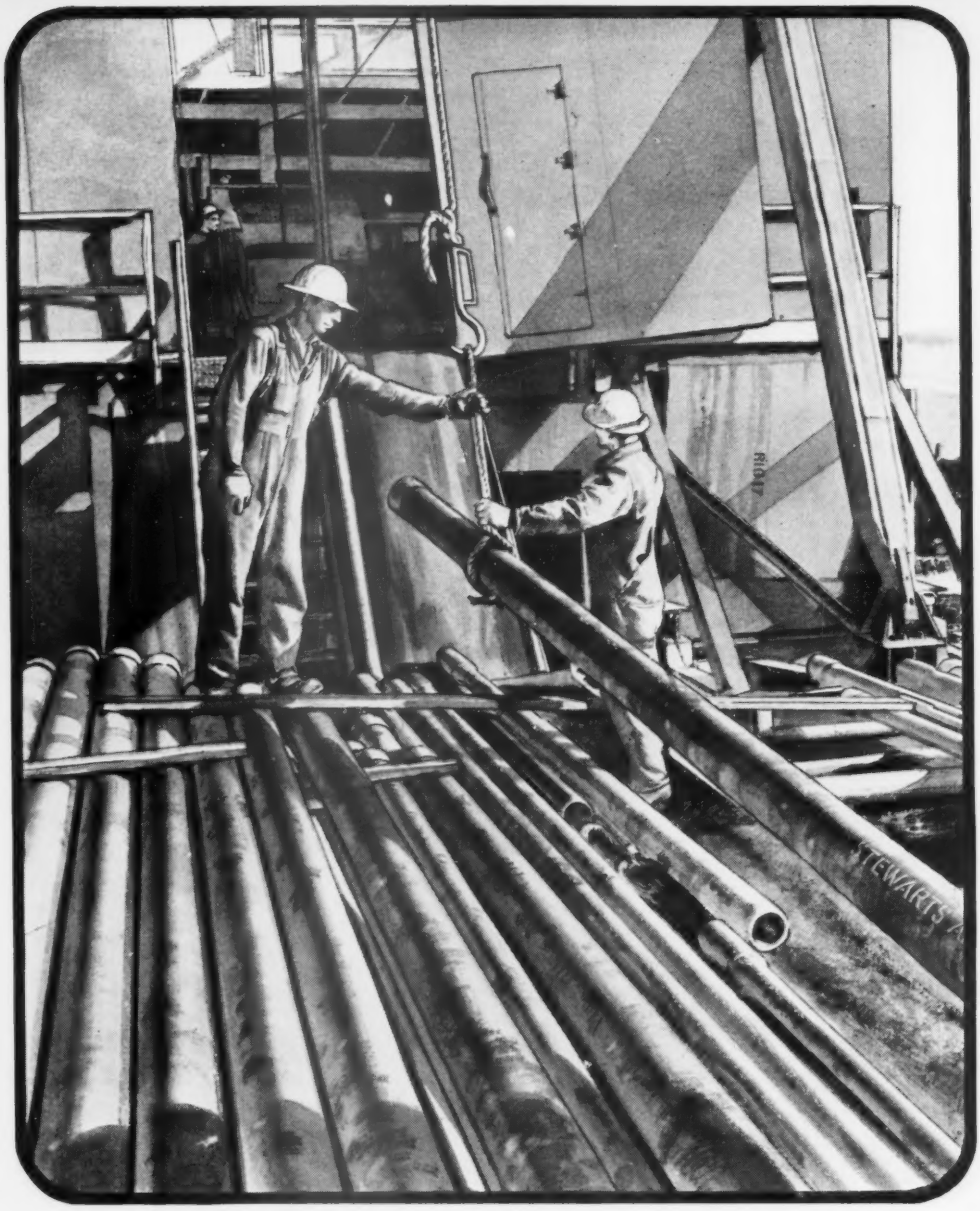

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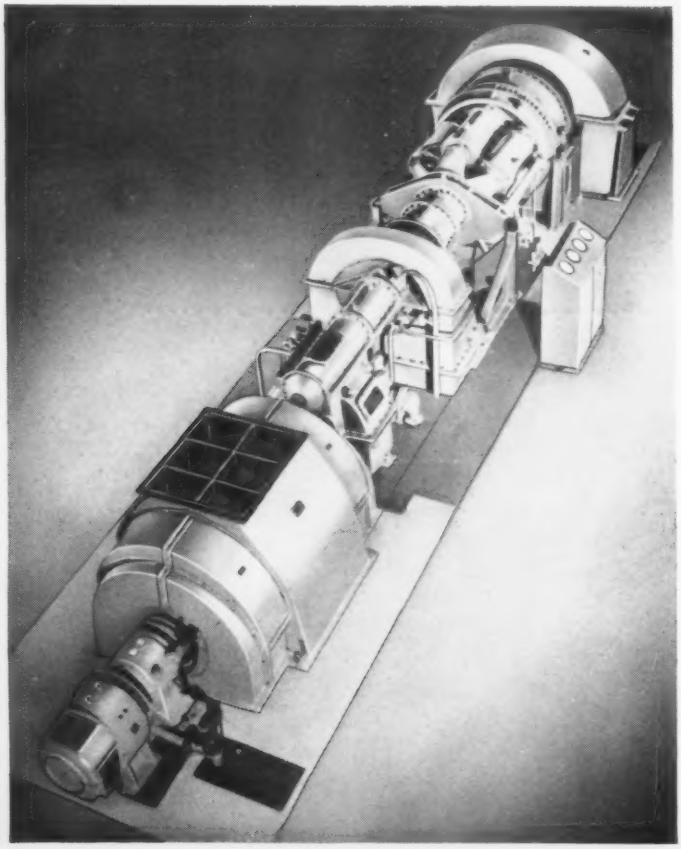

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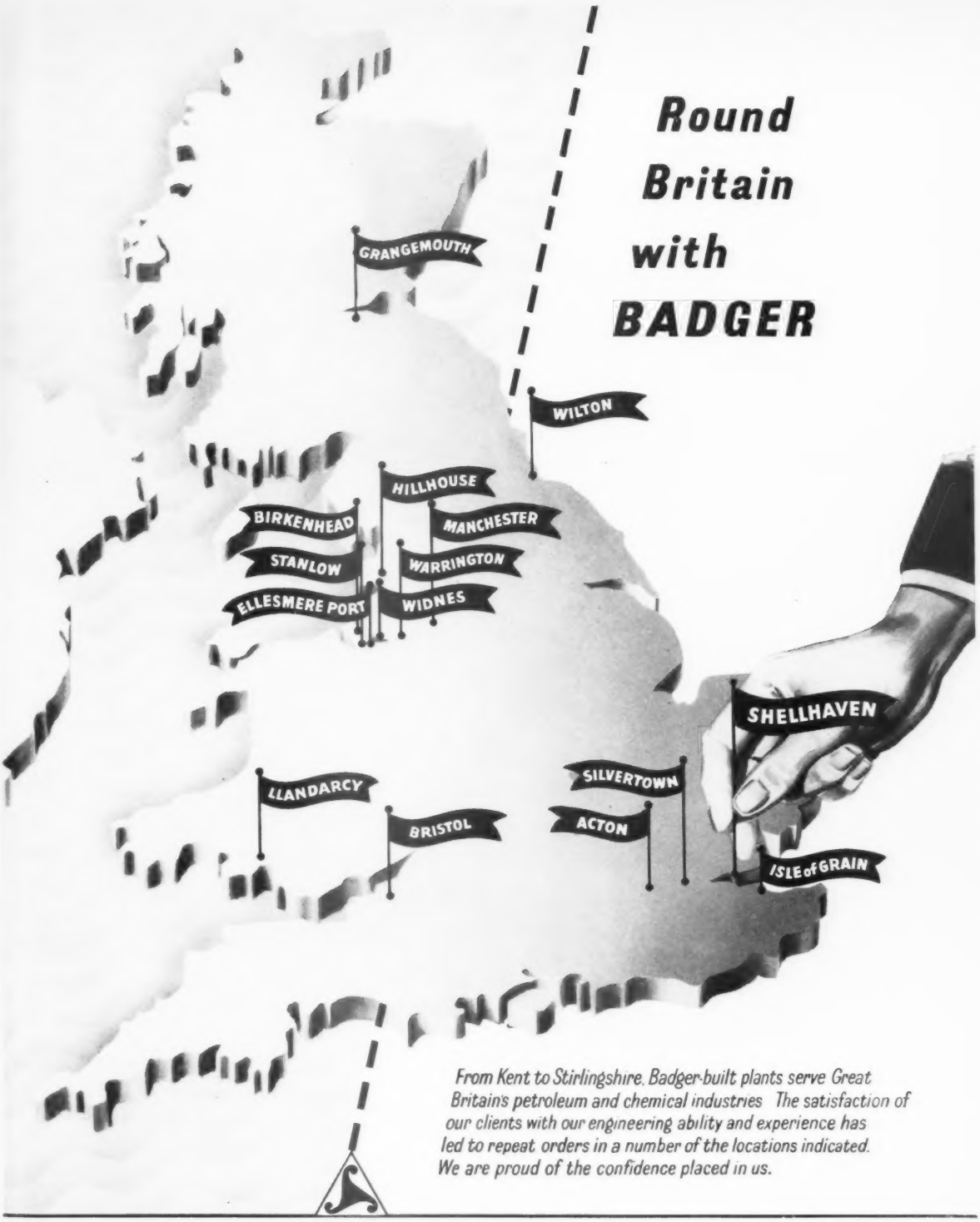

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